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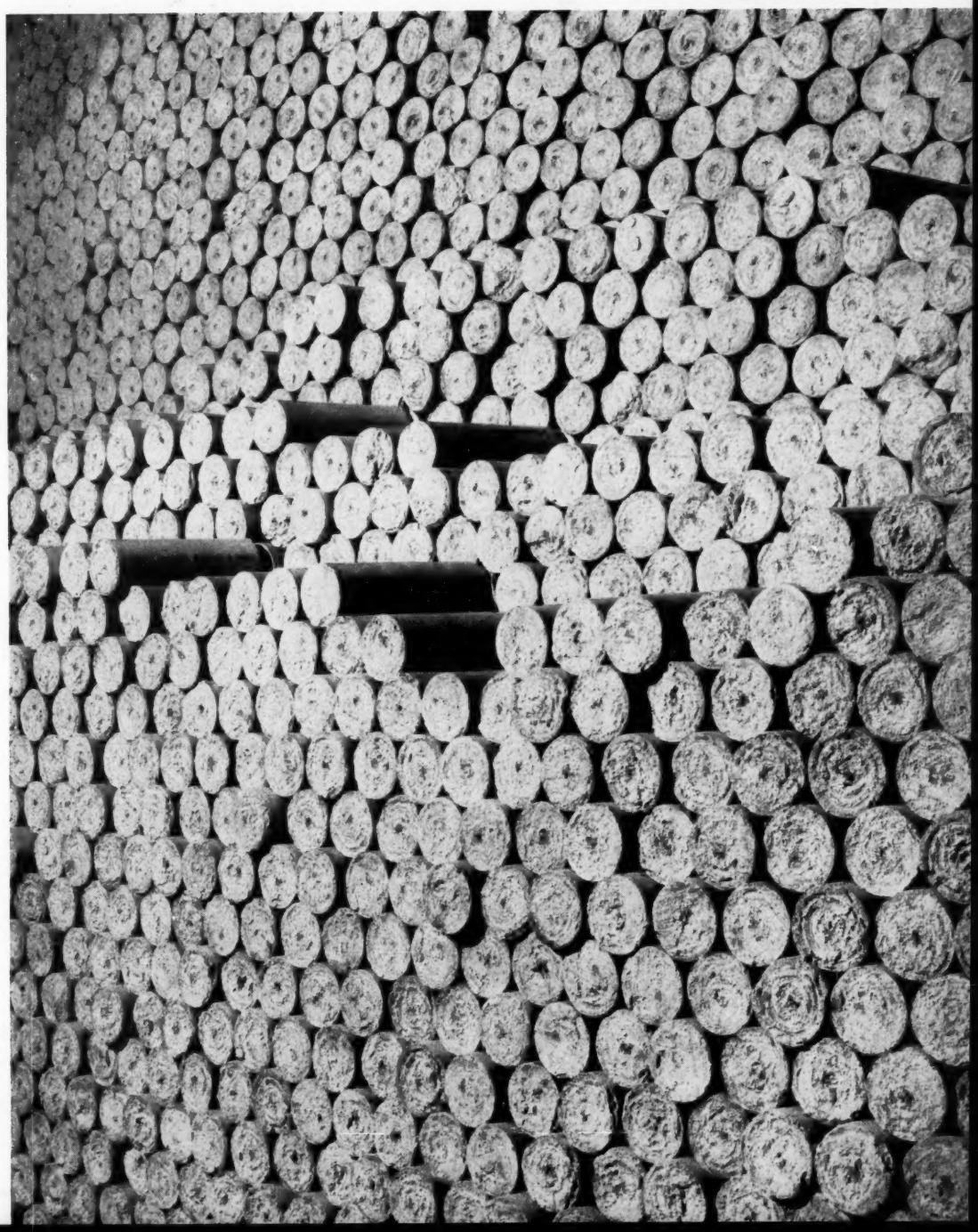
August 1958



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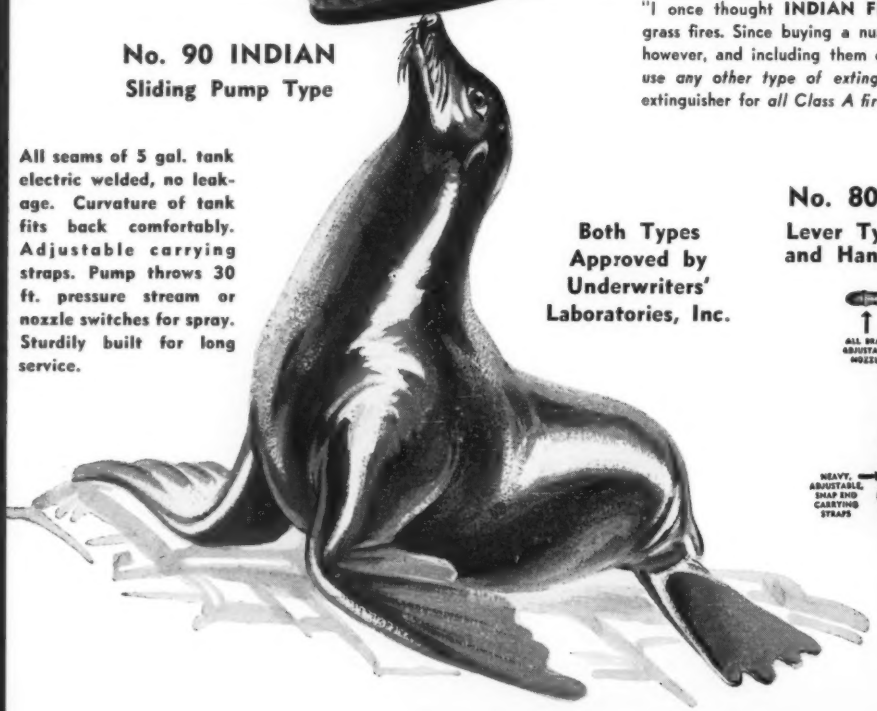

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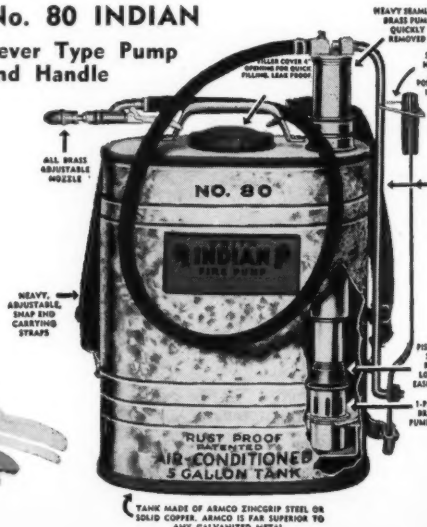

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CHARLES E. POULTON, *Range Management*, Withycombe Hall 302, Oregon State College, Corvallis, Ore.

GEORGE H. SCHROEDER, *Forest Management and Engineering*, Crown Zellerbach Corporation, Public Service Building, Portland 4, Ore.

PHILIP C. WAKELEY, *Forest Genetics and Artificial Regeneration*, Southern Forest Experiment Station, 704 Lowich Building, 2026 St. Charles Avenue, New Orleans 13, La.

LEE E. YEAGER, *Forest-Wildlife Management and Recreation*, Colorado Cooperative Wildlife Research Unit, 243 Forestry Building, Colorado State University, Fort Collins, Colo.

LLOYD THORPE, *Advertising Representative*, 212 General Insurance Building, Seattle 5, Wash.

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(Photo courtesy Weyerhaeuser Timber Company)

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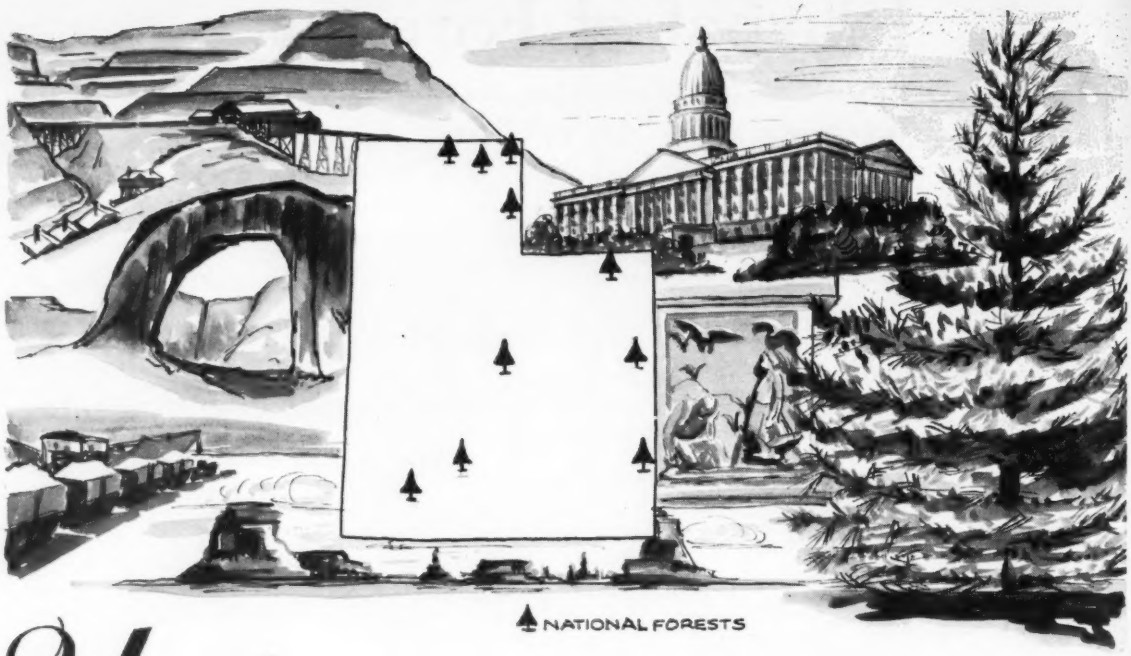

Utah

Utah is a high elevation state divided between the Colorado drainage and the Great Basin. The majority of the state's population lives along the West side of the Wasatch Mountains creating a unique watershed-community relationship. Concern over water production and flood prevention is paramount in all forest management.

The Timber Resource Review lists 3,014,000 acres of commercial forest land in Utah. Ownership is spread as follows: 2,566,000 federally owned; 392,000 privately owned; and 56,000 acres in state ownership. Lodgepole and ponderosa pine, douglas fir, spruce and white fir, aspen and cottonwood are the species represented in the commercial forest lands.

Seventy four small sawmills operate on a continuous basis in the state. The estimated annual production of sawmill products is 73 million board feet. It is felt that the growth rate of Utah commercial stands can be tripled and production increased to 438 million feet per year. Great strides are being made in reaching the state's production goals through the increasing economic stature of Utah species, increasing demand for wood products by a growing population, timber access roads and improved milling practice.

The State Forester is currently rendering technical management assistance to private owners and operates a forest tree nursery at Logan.

Nearly 5.2 million board feet of aspen, bottomland hardwoods, was harvested in Utah during 1957. Part of the cut is being converted for use by a gang-saw near Salt Lake City and the balance is being used for excelsior production at a plant near Cedar City. Prospects for aspen chipboard plant are bright. Cultural methods will have to undergo rapid change if continuing crops of aspen are to be made available to industry. Pulp plants for lodgepole pine and aspen have been under consideration, but an unfavorable water situation has precluded such development to date.

One of the unsolved problems confronting Utah land managers is to find an economic product or products from the vast pinon-juniper woodlands. Presently, these lands are producing 2 million fence posts, 32 thousand Christmas trees, some small quantities of pinyon nuts, but only marginal amounts of forage for domestic animals and Utah's world famous deer herds. Some individuals have experimented with naval stores operations on pinyon pine; others have taken cursory looks at producing juniper products. Too little effort has actually been expanded by industry or government to develop this resource.

Imposed upon these uses is one of providing forest recreation to a people whose major cities border the desert. Recreational use of forest areas is booming with rising urbanization and Utah's effort to come into her own as a tourist center.

Multiple use of public and private forest and wildlands will continue to guide Utah's forestry development.

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Forest Products in Today's World

Editorial

FOREST PRODUCTS have held a vital position in our economy since the first settlements in America. In recent years, however, wood and its various derivatives have been vulnerable to the constantly increasing challenge of concrete, steel, light metals, plastics, and other competitive materials, which have made serious inroads in markets formerly dominated by forest products. The loss in markets for wood has been, in part, the natural outcome of progress and invention. But to a disturbing degree, it has been aided by the past complacency and indifference of some segments of the forest industries, which have been too busy with their internal problems to face up to the intensifying competition from without. Today, however, many prominent elements of this industry group recognize that their entire future depends upon meeting this challenge with effective support of both fundamental and applied research, not just in developing improved and new products, processes, and markets, but in making forest land more productive of the kinds, quantities, and qualities of wood best suited to their manufacturing and marketing requirements.

Despite the inroads of competing materials, the forest industries still make up one of our largest basic manufacturing groups, producing goods priced at 15 billion dollars in 1956. In terms of value added by manufacture (8.5 billion dollars), they accounted for more than 7 percent of the 1954 total for all American industries. The recently published Timber Resources for America's Future points out that, while their output naturally fluctuates with economic conditions, wood-based products constituted virtually the same proportion (20 percent) of all physical-structural raw materials consumed in the United States in 1950-1952 as in the period of 1925-1940. However, there have been notable changes over the years in demand for the individual classes of forest products which make up the timber complex. In the early 1900s, lumber comprised more than 70 percent of the consumption of industrial wood, veneer and minor products about 25 percent, and pulpwood but 2 percent. By 1952, lumber had fallen to 62 percent, accompanied by a decrease in minor products, while pulpwood consumption had risen to 27 percent and veneer logs and bolts had also shown a definite increase. The years since 1935 have seen a rise in both total and per capita consumption of all industrial wood, the average annual total consumption for the three-year period of 1950-1952 being the highest on record. It is notable, however, that the increase in pulpwood consumption—more than five fold since 1920—has been the primary factor in maintaining the position of wood in the competition with other physical-structure raw materials.

Higher costs for raw material, labor, machinery, and distribution of products have made more efficient wood utilization imperative to the health and even survival of important segments of the forest industries. Toward this end, notable technical advances have been made, involving improvements in laminating, treating, fabricating, and other processing techniques, including the application of quality control and automation; upgrading the quality of existing products; development of entirely new products and market outlets; and further integration of industries, with resultant product diversification and associated economic benefits.

Conspicuous among the fruits of research in wood utilization have been continued improvements in adhesives and in bonding processes with resultant advances in the production of a wide variety of glued-up products, including laminated wood for both structural and non-structural uses, plywood in flat and molded forms, and combinations of wood with metals, plastics, or other materials, to incorporate desirable qualities of each material. Chemical utilization of wood has been spurred by the phenomenal growth of the pulp and paper industry—the result of increased use of a wide variety of old and new paper products by a growing population. The crowning recent achievement in this field has been the significant increase in the use of hardwoods, associated with development of high-yield pulping processes. Through such steps as these, the pulp and paper industry has been able both to extend its raw material base and to offset at least part of the mounting cost of pulpwood.

Sawmill residuals and other wastes involved in the manufacture of forest products have formed another vital source of raw material for some industries. The availability of such low-cost material has furthered the development of two distinctive groups of products, the hardboards and the more recent particle boards, both of which are finding increasing market acceptance. In the pulp and paper field, the rapidly expanding use of chips from the residues of sawmills and other wood-product plants has facilitated much of the

recent and proposed expansion of the industry.

Sawmill operators have been quick to realize the economic benefits to be derived from the chipping of residuals, and log barkers have been installed at many mills for the purpose of producing bark-free materials for subsequent chipping. The additional value obtained from chips has prompted some sawmill operators to review their standards of merchantability for logs, to the extent of bringing into the mill some which would otherwise be left in the woods as culls.

Despite these advances and many more, the wood-based industries still face a number of critical problems, mostly economic in nature. These are concerned with such matters as obtaining an assured supply of suitable raw materials at an acceptable cost, evolving more efficient processing methods, maintaining an adequate demand for present products, and developing new products and satisfactory markets therefor. To the forest manager, perhaps the foremost related need is to expand and intensify the use of low-grade timber and species now in little demand. A good beginning has been made in this direction in the utilization of hardwoods by the pulp and paper industry, but this is only a start, considering the enormous volumes of wood and fiber that remain untapped.

Research is the most vital ingredient in today's industrial progress. Without marked expansion in this area, the forest industries cannot expect to improve or even maintain their position in the competition for survival. We may take pride in the knowledge that expenditures for forest products research rose from 1.6 to 31 million dollars between 1926 and 1953. But the fact remains that, despite this almost 20-fold increase, the total disbursement for such research in the entire United States in 1953 amounted to but 0.24 percent of the annual product value of the industries concerned. This compares poorly with a national average for all American industries of 1.1 percent, and as much as 5 percent for some manufacturers in direct competition with those in the forest products field.

The lessons of the past and present point up the continuing problems that confront not only industrial and related research organizations, but also the educational institutions that have a stake in maintaining wood's position in the face of present and future challenges. Our forestry schools must seize the opportunities they now have, not just to turn out men well trained for operational and administrative work in the forest products field, but to educate researchers who can make effective contributions to product and process improvement and development. Our private and public research organizations have traditionally placed their chief dependence upon chemists, physicists, and engineers. In the future, there should be an increasing opportunity for wood technologists to take the leading role in forest products research.

The growing recognition of the value of research in forest products is attested by the recent expansion in industrial laboratories and in public and private facilities, including educational institutions, devoted to that end. The programs and plans of representative agencies, presented in the following pages, show well the effective contributions these organizations are making to increase the role of forest products in today's world—and tomorrow's

GEORGE A. GARRATT

Editor's note.—This issue of the JOURNAL OF FORESTRY is primarily devoted to the subject of wood utilization and what is being done by industry, government, and educational institutions to bring about more and better use of this vital and renewable raw material. The particular institutions or agencies whose work is described by our contributors were chosen as representative. Through a knowledge of their attainments and aims can come an appreciation of the work being done by the many agencies throughout the country, similarly engaged, agencies we could not, because of space limitations, present to our readers.

In selecting the subjects to be covered the editors considered the fact that one of the earliest, and at that time most important, uses of wood from America's forests was in shipbuilding. What of wood in the modern, steel encased, atomic powered Navy? See what authors Kuensel and Worth have to say on this subject.

The Use of Wood in Ships and Boats

John G. Kuenzel and Harold E. Worth

Respectively, head and associate head, Wood Products Section, Bureau of Ships, Navy Department, Washington, D.C.

FOR OVER 4,000 years ships and boats of wood traversing the world's waterways have played a key role in man's quest for wider horizons of truth and freedom. Even down to the present day, the United States Navy's wood ships and boats are still playing an essential part in supporting those truths and freedoms. The development of wood ships which has made this possible can best be understood in terms of the long history behind it. Therefore, a few of the significant events which have contributed to the present use of wood in ships are summarized below.

The Phoenicians were among the first builders of seagoing wood craft. Phoenician ships built of timber sailed the Mediterranean as early as 2000 B.C. By 1600 B.C. the timber starved Egyptians were making 65-foot craft from wood bought from the Phoenicians.

Manned by skilled crews and slave oarsmen, merchant ships of the Phoenicians ventured into pirate infested waters beyond the Aegean to Malta, Sicily, around Gibraltar to the Atlantic coast of Spain, and even sailed all the way to Britain in quest of tin. About 600 B.C. Phoenician ships circumnavigated Africa in the service of the Egyptian Pharaohs. Teak wood from the Malibar coast of India is mentioned[1] as a ship timber in this early period, and teak is still today the most valued of all shipbuilding woods.

The Phoenicians, the Egyptians, the Greeks, the Romans, and later the Portuguese and the Spaniards successively exploited the choice Lebanon cedar, cypress, and oak of the Mediterranean forests for their wood ships.

American forests first rang to the shipbuilder's ax 1,000 years ago when, according to their records, the Vikings harvested a cargo of logs in an area believed to be Martha's Vineyard off the coast of Massachusetts. Throughout history, white oak and other choice shipbuilding woods were sought and used by every sea power that explored the Western Hemisphere. White oak was found to be ideal for the keel, frames, ceiling, planking, and beams of the stout craft of that day.

Men whom destiny has marked for some great and significant event to shape the course of human history have in many instances used a wood boat or ship in fulfilling this mission.

From the port of Alexandria, about 60 A.D., a ship set sail for Malta carrying the Apostle Paul on a mission which helped establish Christianity in western civilization. From the best interpretation of the available records, this wood ship was about 110 feet long.

The Santa Maria, from the Port of Palos, Spain, provided the deck from which Columbus first viewed the New World. This slow little 100 ton caravel was about 128 feet long. She carried a crew of 52 men and 5,000 square feet of sail. When she was wrecked on Christmas Eve, 1492, along the north coast of Haiti, the 28-day return voyage to Spain was made in the even smaller Nina and Pinta. All three of these ships were reportedly fitted with keels made from the oak of Europe.

In 1519 the Vittoria, the lone survivor of Magellan's five original ships which had sailed from Seville, returned to Spain. She was a ship of 100 tons. Sailing across the Atlantic and around Patagonia she had reached the Pacific in 15 months. After eventful voyages in the Pacific and Indian Oceans the Vittoria returned up the coast of Africa to Spain, sailing 27,000 miles in three years and one month.

On November 15, 1577, Master Francis Drake left Plymouth with

Photo courtesy Norwegian Naval Attache, Washington, D. C.

FIG. 1.A.—Viking ship 9th Century "Oseburg" hull. Built of Norway oak planking and keel with a Norway pine mast. Length 71 feet.

[1]Clemesha, William Wesley. 1943. The early Arab thallassocracy. The Journal of the Polynesian Society Qtrly., Wellington, New Zealand. Vol. 52, No. 3, pp. 110-132.

FIG. 1B.—The Mayflower, 1620. Length 111 feet.

Official U. S. Navy photos

FIG. 1C.—USS Flying Cloud, 1851. California clipper ship. Length 208 feet.

five ships. From the deck of his flagship, the Pelican or Golden Hind, a 100-ton wood ship, Drake first viewed the California coast. He returned to Plymouth in 1580 after a two-year and nine-month voyage around the world. Knighted by Queen Elizabeth for his globe-circling voyage, he set out in 1585 to raid the West Indies, destroying the Spanish-held St. Augustine, Florida. His Revenge was a ship wholly of English design with flush decks and a poop and forecastle lower than Spanish galleons. She was one of the British ships which engaged the Spanish Armada in 1588. Another of the ships which fought the Spanish Armada in 1588 was the 200-ton Mayflower, which may have been the ship later to become famous.

In 1607 the Susan Constant (100 tons, 111 feet long), Godspeed (40 tons, 68 feet long), and Discovery (20 tons, 49 feet long), all of which were recently replicated for the 350th anniversary of the founding of Jamestown, sailed into the James River bringing Captain John Smith and the first permanent settlers to our Atlantic coast.

In 1609 the Halfmoon, Henry Hudson's ship, opened the way for Dutch colonization of Manhattan Island after sailing from Amsterdam.

In 1620 the Mayflower sailed across the Atlantic to found the most significant colony of all, the Plymouth Plantation.

The colonization of North America and the conquest of India by the European powers added great impetus to shipbuilding. Wood ships were built to carry goods, colonists, and armies to every part of the globe. In those days ships were not strictly categorized as being for commerce or for war. Most ships were armed for protection and were fitted out for war as the occasion demanded. One such was Phineas Pett's advanced design, Sovereign of the Seas, launched in Woolwich, England, for the East Indies trade in 1637. She was 232 feet overall and 128 feet along the keel, had a 49-foot beam, and displaced 1,637 tons. This ship was known as a Man-of-War, the immediate predecessor of the frigate class, which was first evolved by the French, later copied by the English and other continental navies. It required 4,000 timbers to build such ships in French and English shipyards.

The United States Frigate Constitution, launched in 1797, is undoubtedly the most famous ship of this class. Even in those days oak was for practical purposes limited to fifty-foot timbers. Ships of over 200 feet in length could not be built without unacceptable rack and twist in service. Today after 160 years, "Old Ironsides" is still afloat, having been extensively rebuilt in 1931 and rehabilitated in 1954.

Between the years 1777 and 1814, the birth of American freedom became assured after a series of experiences involving wooden ships of American construction—built by American shipwrights to outperform ships of European construction in order that the Colonies might survive. These privateers, of which there were 323 built of wood from American forests by 1782, played an important role in our early history. One such ship, the Grand Turk, built in 1781, sailed on December 3, 1785, to Canton, being the third American ship to reach China. The American Navy was born during this period. The wood frigates had their origin while our country was being founded. Such ships as the U. S. Frigate Constitution by her seaworthiness and her maneuverability, helped establish the superiority of the ships of the newly formed United States of America.

The Clipper Ship Era from 1843, arising as a result of the competition in the China tea trade and continuing under the stimulating influence of the discovery of gold in California and Australia in 1849 and 1851, continued to prove the superiority of American-built ships of wood. This era which witnessed the highest development of the sailing ship in construction, speed, and beauty, ended with the opening of the Suez Canal in 1869.

Although wood was used for the hull of most of the earliest steam-driven ships, it soon gave way to iron and steel. The last United States Navy wood ship of the line was built at New York Naval Ship-

yard. This ship, the USS Trenton, was a full-rigged ship of 2,300 tons. She was lost in a Samoan hurricane in 1889.

The many historic deeds of exploration and conquest related above would obviously not have been possible had it not been for a well developed skill in the building of ships. Shipbuilding is, in fact, one of our oldest organized industries. Because of the size and complexity of seagoing ships, their construction has always required a high degree of integration of skills. Spurred on by the endless struggle of maritime powers for dominance of the seas, the art and craft of shipbuilding was brought to a high state of development. Knowledge and skills were passed from father to son—each new generation and century adding its small bit of progress.

Then in 1605 King James I of England took the first step toward making shipbuilding a science by chartering the Shipwrights Guild. Under the leadership of Master Shipwright Phineas Pett the Guild supervised all shipbuilding in England. Many innovations were introduced, including the scale model and mathematically developed plans.

During the 19th century naval architecture became an established engineering discipline with its own professional societies on both sides of the Atlantic. Schools of naval architecture began operating in England, Germany, and the United States.

Wood as an Engineering Material for Ships

The most rapid growth of scientific shipbuilding came with the advent of iron and steel as the principal material of construction. This was made possible by the phenomenal advances in the metallurgical sciences and technologies. In the case of wooden ships and boats, which continued to be built for many purposes, the construction methods which persisted were those of the craftsman, not the engineer, because the wood sciences and technologies had not yet emerged as engineering tools.

Until World War II practically all construction of wooden ships and boats was based on time-honored traditions. The pressures of war, however, stirred things up. For the first time wood was put to use in unconventional ways. The plywood torpedo boat and landing craft and the cleanly framed motor minesweeper represented great strides forward in wood design. Even greater breaks with tradition followed during and after the Korean War. An entire family of specialized minesweepers was designed and built in which wood was chosen as the principal material. This choice was made on the basis of wood's structural merits and availability in comparison with other non-magnetic materials, as evaluated by the naval architect and design engineer. Structural capabilities of wood laminates were recognized and accepted for the first time in ships of this size.

Wood was able to meet this challenge because of the basic fund of performance data which could be made available to the designer. It was convincingly shown that wood materials and techniques are compatible with such modern industrial factors as mass production, engineering, and economy. It was also necessary to overcome the native prejudice of most naval architects and engineers toward natural materials. To the average engineer the unlimited variability which nature bestows upon wood is something which cannot be coped with in a closely engineered structure. Since the engineer is accustomed to working with materials which are produced to have certain predictable properties, it is difficult for him to accept the selective "grading" system used for lumber.

Regardless of whether we consider the engineer's skepticism over the use of wood to be justified or not, the fact remains that the prejudice does exist and is a real barrier to the adoption of wood as an engineering material.

It is the rigorous task of those who wish to see wood used effectively in engineered applications to demonstrate how wood is best for the job. Vigorous technical selling backed by solid facts is required. Fortunately, the results of this approach are being felt. Through the efforts of our growing numbers of wood technology laboratories, our educational institutions and their professional graduates, and the enlightened viewpoint of many producers and consumers, wood is gradually achieving a deserved status as an engineering material.

The Navy's modern wooden ships are but one example of this trend. There are many equally significant civilian examples. All such applications place primary emphasis on the basic principles of science, wood technology, and engineering rather than experience or tradition. By logical, systematic development, materials and components of known characteristics are put together to give a predetermined performance. It is not important whether the end product resembles its forbears or not, but it is mandatory that its performance meet design expectations.

The necessity for the engineering approach in our rapidly changing world is evident. Time no longer permits us to develop better products by cut-and-try methods. Applications of materials must often be projected far beyond any previous experience. As in the case of other basic materials used in engineered products, wood must be adapted to the expected performance level.

The real successes in using wood as an engineering material in the Bureau of Ships has come from taking the "if" out of wood for the engineer. There are several ways of achieving this.

First, by empirical tests, the characteristics of typical pieces of wood falling within some loosely defined classification can be determined; then by applying liberal factors of safety it can be reasonably assured that the performance will not drop below some acceptable minimum. In shipbuilding

this approach is generally not desirable, since a large part of the ship structure is in effect overdesigned. Overdesigning in ships takes away valuable space and adds weight. Both space and weight are always critical on a warship.

Second, by meticulous selection wood can be chosen which is so uniform in character that its performance can be predicted without allowance for variability. This approach while acceptable to the engineer is costly and meets stiff opposition from the lumber industry. Furthermore, rigid selectivity, which has always been a hardship, is becoming more and more difficult as the quality of the harvestable timber in our forests drops.

A third approach is to reduce wood to relatively small basic components of easily controlled uniformity, which are then combined to provide a more desirable distribution of properties. This is the approach that has earned wood a continued place in the design of naval craft and in many other engineered structures. It strikes a responsive chord among design engineers, who are most familiar with synthetic materials, that is, materials which are formulated rather than selected for desired characteristics. Furthermore, techniques which have developed out of this approach have greatly extended the potential of wood as a structural material, particularly where its size and shape as it occurs in nature have been limiting factors.

Wood Research for Shipbuilding

In order to pursue the last mentioned approach to engineered use of wood it is necessary to maintain a supporting program of research and development and to establish adequate specifications and standards. It is also essential to develop reliable quality assurance procedures if the engineered product is to fulfill its expectations. In the Bureau of Ships, as in all engineering organizations which successfully use wood, these supporting functions are considered an integral part of the design effort. They are managed by wood specialists who can translate the background of wood science and technology into usable data for the engineer.

Bearing in mind that it is the function of the Bureau of Ships to design, construct, and maintain all types of ships and craft for the Navy, it may be of interest to know something of the program of research and development required to support this function.

The scale of the program, when compared to the private and public effort devoted to the development of other basic structural materials, is quite modest. Within the field of wood alone, however, the Bureau's program is one of the largest—amounting to about $250,000 per year in terms of dollars and involving at present the services of two private and five government laboratories.

For purposes of administration and reporting, the work is divided into three task areas of generally related subtasks.

The first of these areas covers fabricated products, including wood laminates, plywood, and other miscellaneous products which require manufacture beyond the sawmill or planing mill stage. This area also encompasses wood adhesives, which play such a vital role in modern wood fabrication.

The second task area includes basic lumber products—the product of the sawmill and planing mill. It also includes studies of the fundamental properties of wood, both foreign and domestic.

The third area embraces materials and techniques for prevention of wood deterioration. Wood preservatives, fire retardants, sealing compounds and other preventatives are developed and tested. Also the environmental factors which affect deterioration are analyzed.

Within the three task areas outlined above, about 35 individual subtasks are presently underway. In scope these subtasks range from quick tests supplying urgently needed information on immediate Fleet problems to comprehensive long range development of products and attendant engineering data. The following examples are indicative of the type of pioneering research and development which are needed to support the Navy's operations.

1. *Wood laminates.* The Navy, with much outside assistance, has adapted the principle of wood laminating to marine use with outstanding success. Current research and development is designed to expand the species which may be utilized, to develop further economical shipboard uses of laminates, to provide more complete design information, and to impart greater decay resistance.

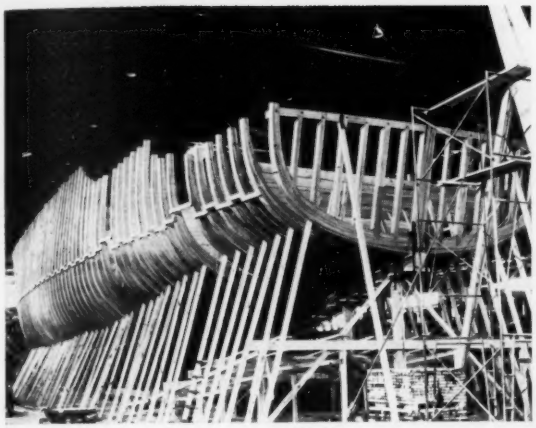
2. *Plywood.* Since plywood used in boats and ships is subject to more rigorous conditions than normal exterior plywood, especially durable types must be developed. Current efforts in this field include development of plywood made from naturally decay and marine borer resistant veneers and from veneers which are preservative treated before bonding. Also, treatment of plywood panels with low flammability oil-borne preservatives is being considered. Improved molded plywood is being developed for use in small craft hulls and certain ship components.

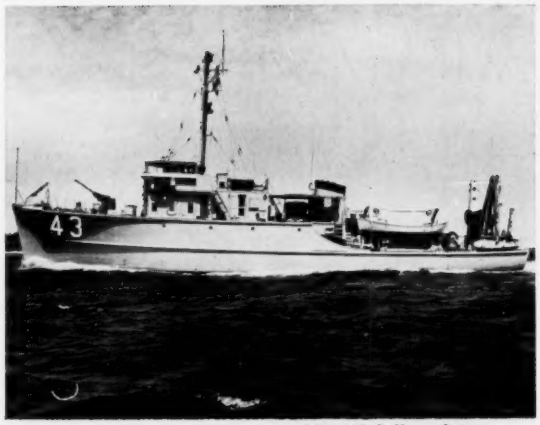
3. *Fastenings.* Traditional methods of mechanically fastening wood are being scrutinized to determine if improved fastening systems can be developed which will take better advantage of the inherent strength of wood.

4. *Fundamental properties.* The basic physical and mechanical properties of little known woods (mostly from the tropics) are being explored to determine their applicability to shipbuilding.

5. *Wood preservatives.* Techniques are being developed which will make complete decay protection in wood ships and boats practicable. Also, means of decreasing the flammability of petroleum solvents for preservatives are under investigation.

6. *Adhesives.* The present adhesives used for marine wood products provide excellent durability; however, the conditions under





Official U. S. Navy photos.

FIG. 2—*Left:* MSO minesweeper wood ship, 1953. Oak structural laminates transom and hull frames. Length 165 feet. *Right:* "USS Bittern" minehunter, 1957. The first all pressure preservative treated laminated red oak hull. Length 144 feet.

which they can be satisfactorily used are very exacting. Although the Bureau undertakes no development of new adhesives, it encourages such development and evaluates newly introduced commercial products for potential improvement of marine applications. A continual effort is also made to improve adhesive testing methods.

The examples cited above, while not complete, indicate the scope of the research and development which the Bureau finds it profitable to conduct in the area of wood products. Such programs of support for design and engineering are regrettably rare both in government and in private industry. Perhaps this is because many organizations do not realize the tangible benefits which can result from even a modest effort in this direction.

Wood Ships

The translation of research and development findings into action comes about in many different ways in the Bureau of Ships. In all cases, however, it reflects itself in the design, construction or maintenance of a ship, a small craft, or a component thereof. An idea of the effect this has on the end product can best be obtained by a look at developments in the Navy's wooden ships.

The hull characteristics of wooden ships during the past ten centuries are illustrated in Figure 1. The major structural changes taking place during the past ten years in adapting wood as an engineering material for the hulls of ships and boats are illustrated in Figure 2.

The United States Navy found itself with only a small number of wooden minesweepers available when the Korean war began and was also faced with the inability to use steel ships due to the powerful magnetic field they created. A heavy sowing of magnetic influence mines resulted in the loss of several ships in Korean waters.

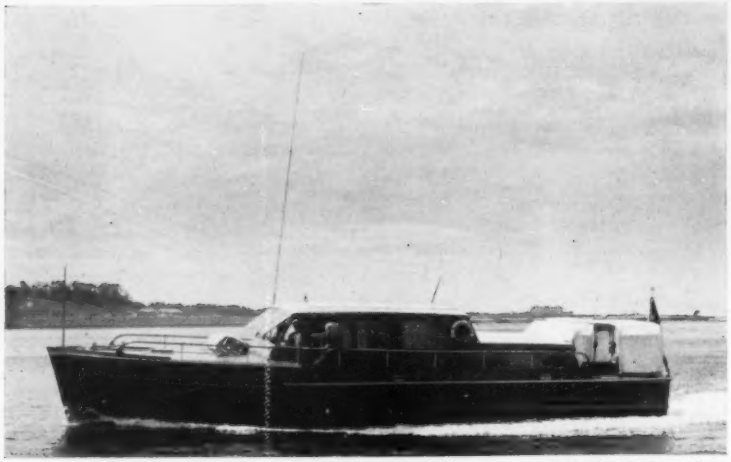
A crash program was initiated to develop and build a family of effective nonmagnetic minecraft. Wood was chosen for the hulls as the only practical structural material available with the desired nonmagnetic properties.

Bureau ship designers studied wooden hulls as far back as Viking ships to study principles of construction. The World War II YMS was a take off point and the end product was a completely new ship—the 165-foot MSO 421 class of ocean minesweeper. Contract awards began in 1951, and during the intervening years an impressive number of wood hull ships have been added to the navies of the free countries of the world. These have included MSO, MSC, MSI for ocean, coastal, and inshore minesweeping service; the MHC, a new prototype coastal minehunter; the MSL, a 36-foot minesweeping launch; the YP, a training and district patrol craft; the SC or 110-foot subchaser; and the PGM or 110-foot patrol gunboat. Over 300 such wood craft are serving as American built wood ships in both the United States Navy and the navies of other free countries throughout the world.

In minecraft construction the selection of sound, durable, high grade woods, plywoods, and laminates is a particularly important consideration as this assures ability to withstand rugged service. Shock and underwater explosion tests on recently constructed craft of this type have shown that wood hulls perform well in comparison with hulls of any other shipbuilding material.

There is a trend toward use of more and more wood laminates. Although the specifications for MSC coastal minesweepers still permit the use of either steam bent or laminated frames, only a few of the builders now elect to use steam bent frames in preference to laminates.

A major advance has been in improving the durability of wooden ships. This has been accomplished by such practices as using resistant hardwood and preservative-treated wood and avoiding untreated sapwood. Designers have also



Official U. S. Navy photo.

FIG. 3.—Wood hull boat, 40 foot area command cutter built of Philippine woods, 1957.

carefully considered the elimination of fresh water leaks and other decay-producing hazards. Ships have been made marine borer proof through the use of effective-treated materials.

Another growing development in wood shipbuilding is prefabrication. The deckhouses on the ocean minesweepers, MSO 423 and 424 were prefabricated. The minehunter, MHC 43, included prefabricated frames which were laminated and bevelled to final shape at a plant a thousand miles from the shipyard. A three-foot section was cut from the ends of the frames to permit rail shipment in standard cars. These were then glued at the building yard by use of a portable heat curing box. There is a splendid opportunity for prefabrication of watertight bulkheads for all classes of wood ships and boats.

Wood deckhouses are being considered for possible use on certain steel and aluminum hulled patrol craft designed to operate in tropical waters. They are light in construction, have good insulation properties for tropical conditions, and can be designed to withstand severe storms.

American-built minesweepers use domestic oak and Douglas-fir almost exclusively. In certain countries of the free world where choice timbers are not abundant, greater reliance is placed on the use of imported tropical woods. These tropical species, some of which are little known in the United States, offer excellent quality, durability, and strength in large size, all heartwood members.

To provide greater durability when American oak is used, specifications have been developed for gluing treated red oak and white oak laminates having unlimited sapwood. Treated red oak laminates have been used successfully in the MHC 43 and when one of the authors recently visited aboard this ship, the skipper assured him that hull performance was very good under all service conditions.

Wood Boats

By virtue of its long use in boats, wood has suffered every imaginable abuse as a material. There is more to a properly built boat than the average layman, or boat builder for that matter, is aware of, and quite a little engineering skill is required, not only in its fabrication, but also in its maintenance and care.

Research in ways and means of extending the service life of wood craft has emphasized the need for improving storage practices. In the past stock boats have frequently been subjected to full weather exposure for long periods without raintight, ventilated shelters.

Based on an analysis of maintenance and repair costs of small wood craft, the Bureau has begun a program to assure adequate protection of all stock boats and proper preservation of all the component parts.

In selecting new boat building woods, several factors in addition to durability are considered as making wood boats particularly suited to naval use.[2]

1. *Strength.* Wood for boats and ships must have great strength in relation to its weight. The use of laminated members greatly reduces the strength loss formerly incurred by use of fastenings. Impact resistance probably is one of the more important mechanical properties which make wood desirable for boatbuilding. In wooden construction of any form, 100 percent over the working stress is allowable for short-term loading in impact. This is an important factor which makes wood hulls "bounce back" undamaged from severe contact with piers or from the shock of underwater explosions.

2. *Insulation.* Wood has good natural insulating qualities, a factor which makes boats easier to heat in cold climates and easy to cool in tropical climates. Wood decks, because of their resiliency and excellent wearing and insulating qualities, are preferred on many ships as well as on boats.

3. *Corrosion-resistance.* There is no corrosion problem with a wood hull fastened with silicon bronze or Monel fasteners. Wood does not lose its strength by aging.

4. *Adaptability.* Wood boats are readily adaptable to conversion for different missions. Standard boats can be modified for specialized functions by economical measures.

5. *Material availability.* Wood, an ever-renewing resource, is relatively available even under adverse emergency conditions. In addition to our domestic resources, potential supplies of lumber in the tropics have scarcely been touched. The use of laminated materials also greatly increases the potential supply of lumber for boat and ship members.

[2]Hartley, Richard. 1957. Serviceability of wooden boats. Bureau of Ships Journal, Vol. 6, No. 8, pp. 10-12.

The fact that lumber is so widely available makes it possible to build and repair in some very remote areas. The construction of a 50-area command cutter (Fig. 3.) utilizing durable and strong Philippine species readily available at the Subic Bay, P. I., Boat Repair Facility, has been possible on the basis of engineering data supplied by Bureau research.

6. *Low cost.* The cost of boatbuilding lumber averages about $0.10 a pound. Maintenance costs for wood boats are not excessive, if a small amount of judgment is exercised during active service and adequate shelter is provided during period of inactivity.

Over the years many competitive materials have made a bid for wood's place as a boatbuilding material. Some of these materials have been used very successfully. Wood boats, however, still comprise the largest portion of naval small craft.

There are many naval boats in service today that are still in excellent condition after more than twenty years of reliable service.

New Wood Ship Manual

A handbook which provided technical facts about wood for the ship and boat builder was first issued by the Bureau of Ships in 1945 under the title *Wood: A Manual for its Use in Wooden Vessels.* Its principal purpose was to serve the nation in the construction of great numbers of wood hulls of all types for World War II service. Hull building techniques were in a state of rapid development as new materials and methods were introduced. The object at that time was to assist builders in making proper use of lumber, plywood, and other materials under these rapidly changing conditions.

During the past ten years there have been many new developments in materials and methods of wood ship construction. These are chiefly in the fields of gluing, laminating, preservative treatments, and hull prefabrication. The Bureau is now completing a revision of the manual. The new manual contains the latest information on wood as an engineering material for boats and ships, based on actual building experience and on research.

The manual also includes information on hull preservation, storage, and repair to fill an important need in realizing the maximum service life from wood craft. During the years since 1945, problems of storage and maintenance have become increasingly important, and considerable information has been assembled on this subject.

In view of the variety of data now included, and for convenience in handling, the material has been divided into four volumes as follows:

Volume I—Basic Wood Technology Applicable to Shipbuilding;

Volume II—Techniques and Practices Applicable to Preservation and Storage;

Volume III (*Confidential*)—Technical Data Applicable to Boat and Ship Design;

Volume IV (*Confidential*)—Techniques Applicable to Boat and Ship Construction.

These volumes comprise a printed record of the wood shipbuilding knowledge which men of the wood boat and shipbuilding profession have developed, maintained, and perpetuated since the building of the first wooden ships.

The wooden ships built today continue to play an important role in the evolution of water transportation. Historically, the Navy has always been a leader in the materials development field. This applies to wood as well as to other shipbuilding materials. From the days of sailing frigates, down to the present pressure preservative treated laminated 145-foot all wood coastal minehunter, the Navy has pioneered in using wood to its best advantage as a structural material. Wood provides properties well adapted to the rugged service requirement of these ships.

Wood as an engineering material is a new concept—even in the Navy. The 1952 revision of the Naval Academy textbook on engineering materials[3] devotes only a single paragraph to wood. In contrast to this, the Navy actually uses more wood than any other structural material except steel. The one paragraph is, however, surprisingly prophetic. It states, "As our natural mineral resources are being consumed to the vanishing point, it is anticipated that wood again will become an important structural material."

There are centuries of evidence in both naval and private experience that wood craft properly built and cared for are highly reliable. When boat and shipbuilders use wood in accordance with good engineering principles, the result is an assurance of quality and performance not readily equalled or surpassed by any other material. True economy dictates that only the highest quality of strong durable woods and workmanship be used. This truth holds in boat and shipbuilding more than in any other industry. The buffeting by forces in storms at sea is greater than those encountered in any other environment. In the light of these facts, well established by history, it is not surprising that in these days of atomic-powered submarines, super aircraft carriers, and guided missile ships the Navy still sends its wooden ships into all the oceans of the world on missions of crucial importance.

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[3]United States Naval Academy. 1952. Engineering materials. United States Naval Institute, Annapolis, Md., Ch. XIV, pp. 14-1.

The U. S. Forest Products Laboratory

J. A. Hall
Director, Forest Products Laboratory,[1]
Forest Service,
U. S. Department of Agriculture

THERE IS an excellent discipline in the central theme of this issue of the JOURNAL—"What's New in Wood Technology." It invites the writer to forego the backward look, any complacency that might derive from nearly a half century of activity, and to focus sharply on wood technology today, trends today, and where those trends may logically be expected to take both wood utilization and forest management practices. It is a challenge too, to forget present limitations and consider research that needs doing, with confidence that all promising approaches to better wood utilization will be explored fully.

The general purpose of research at the Forest Products Laboratory can be summarized quite briefly. The Laboratory's purpose is to extend the knowledge of wood in both area and depth—to obtain more and more accurate data, both chemical and physical, that pertains to all wood, and increasingly to study the variations that occur between species. This is the knowledge, derived one way or another, that must go before or at least accompany efficient use of wood. The more efficient and profitable utilization of forest products is, of course, the ultimate goal of our research. Since this is a distinctly practical world we do more applied research than we do basic or fundamental research but continually strive to sequester researchers of the right type for the fundamental research. Ultimately, basic research is the source to which all applied research must go to be replenished.

FIG. 1.—The Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, at Madison, Wisconsin.

Wood as a Manageable Product

It would be something less than enterprising if research accepted wood as an unmanageable product of nature, with all of its variability, and did not attempt to find out how the natural environment influences properties. There is a point beyond which variability ceases to serve the ends of versatility, and a point beyond which environmental effects produce unwanted properties in wood until it is no longer a useful product. Control of environment and, if possible, heredity, is the first step toward production of wood as a high-utility raw material.

So, at the Forest Products Laboratory we operate one field of research in which we try to find out what influence growth conditions of trees have on the properties and hence the usefulness of the wood produced. Chemical and physical properties, properties of soil, root competition, solar radiation, elevation, exposure, and climate are assayed as wood-quality determinants. The information arising from such studies can be put to work at once in the evaluation of old-growth timber, and it is the base on which the concept of wood grown to quality specifications must be reared. A similar study deals with the effects of silvicultural treatments, such as thinning, pruning, and intermediate cuts, on wood quality. An additional phase, which brings a closer look to some of the results of environmental influences, concerns the place that both normal and abnormal wood structures have in determining wood properties. In this line of work all of the technological developments and findings of six other research divisions are linked up with the needs of forest land ownership and management. Clearly, this work depends heavily upon close cooperation with the forest experiment stations.

Appropriately our research group concerned with growth and quality relations also exercises technical guidance in research on harvesting methods and equipment and log grading, in addition to direct research on small sawmill improvement and technology of wood cutting and machining equipment.

Wood Seasoning

It would be difficult to overestimate the importance of moisture content control in connection with wood utilization. For most com-

[1]Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

modities left to the consumer's care beyond the jurisdiction of designer or manufacturer, the question of satisfactory service depends on whether the wood was originally seasoned properly and whether it is given reasonable protection from moisture later. For that reason we continue the effort to improve air seasoning and kiln drying methods, to understand better the relationships between wood shrinking and swelling, induced drying stresses, and the prevention of defects in drying and moisture movement in wood. There is room for improvement in kiln drying schedules with respect to speed of drying and the safe limits within which wood can be stressed. Since industrial practice in many instances lags considerably behind the best that was known a decade ago, the seasoning researchers have traditionally devoted much time to missionary efforts which, when supported by industry management, produce quick dividends in wood conserved and products improved.

Strength Properties

The outlines of strength properties for 175 American woods have been roughed in but much research remains to be done on more refined strength testing methods, on species assuming new economic significance, on new forms of wood construction, and on new wood-base materials. One of the requisites, in order that structural wood may compete to the limits of merit with other materials, is that full data, comparable to the ever handy tables in the engineering handbooks, be at the disposal of engineers. That is why the Forest Products Laboratory conducts a program of strength tests on wood in both natural and modified forms —on mechanical properties, factors affecting strength, structural grading of timber and working stresses, timber design, and the special problems associated with special products. Every newly developed product coming to the market—such as the burgeoning family of structural sheet materials and the new composites of wood, paper, and other materials—brings a new need for accurate and reliable strength data.

Protection and Service

Wood is not unique among structural materials in the need for protection in service. Although rust and corrosion are not a problem, wood that is under exposure to continued wet conditions in service — and especially while in contact with the ground—needs chemical wood preservatives to give long life in service and make it economically attractive. Ours is a three-branched attack on problems of wood preservation. One line of research investigates the effects of wood-destroying and staining fungi on the structure and service life of wood. Another approach consists in the evaluation of preservative chemicals by means of accelerated tests with fungi grown in pure cultures on wood. A third phase of the work deals only with treating methods with a view to getting more effective and cheaper impregnations of wood with protective chemicals.

Wood protection for service is the objective of special lines of research dealing with paints and finishes. The satisfaction and serviceability of structural wood for housing are closely related to the paints and painting methods employed on house exteriors. Protection against fire at reasonable cost is the goal of research on fire-retardant chemicals.

Containers

Wood used either as wood or as fiber has an important claim to consideration on at least two counts when it is used for boxes, crates, pallets, drums, cartons, or other container forms. Here is a present outlet for some six billion board feet of wood annually as well as the product in which most of the goods of the world are shipped and stored. Many billions of dollars in merchandise is entrusted to wood and fiber containers, and economic waste running into the hundreds of millions results when claims are paid for goods lost or damaged because they were shipped in containers made without benefit of sound design. The objective of better containers from forest products is served by Forest Products Laboratory research on boxes, crates, and pallets. Much of the progress of this work has been tied to the tremendous wartime needs of military logistics. The peacetime stakes in packaging can scarcely be overestimated.

Veneers and Special Products

In the field of veneers, plywood, glued products, and composite and reconstituted wood products, research aims to solve some very old wood-use problems with the aid of some very modern commodities. Research is under way on optimum cutting conditions for veneers, a study that should, by slicing techniques, open the way to increased use of neglected hardwood and more efficient production of both softwood and hardwood veneers. Similarly, by means of improved adhesives and with new procedures, such as overlaying with durable papers, a new line of plywood and composite products may lead the way into increased use of wood in distinctly new products with high standards of both durability and appearance. In the field of particle boards the objectives are dual—new and better modern products from wood and more effective use of wood fiber, including once-wasted residues.

Pulp and Paper

The consumption of pulp and paper in the United States has now increased to the point that the annual use is equivalent to 436 pounds per capita (reported in 1956) per year. With the aid of a completely equipped experimental-scale pulp and paper mill, the Laboratory seeks to improve existing pulping and papermaking processes and to develop new and more economical methods. Since huge stands of second-growth hardwoods abound in the United States a major objective of this research is to enlarge the use of hardwoods. One process resulting from this research already accounts for an annual use of hardwoods amounting to a million and a half tons of

FIG. 2.—A wood technologist studies growth rate of trees of known heredity in the search for parent stock capable of producing tree progeny with strong, even textured wood.

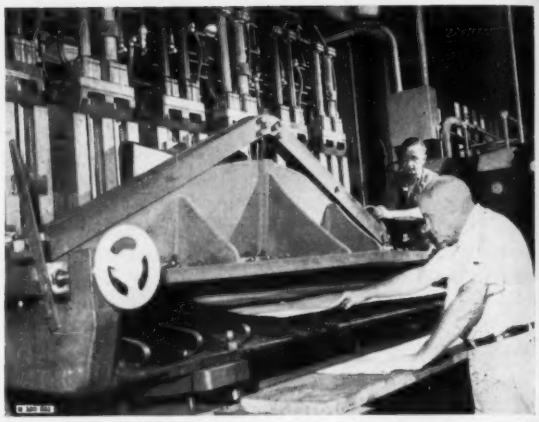

FIG. 3.—With this precision veneer slicer research is under way looking to more and better fine veneers from neglected hardwoods.

pulp per year. A new process offering additional promise for hardwoods and even higher net yields is being vigorously prosecuted. Because of the opportunity that pulp products offer for more use of the hardwoods, especially in view of the promise of more structural use of pulp and fiber products and composites, continuing pulp and paper research must be vigorously pursued if the forests are to meet the needs of our growing population and standard of living.

Chemical Products

Ultimately, in order that the forest resource be used to its fullest practical extent, vast residues developed in conventional wood processing must be opened up as a new source of chemical products. The task of working out modern chemical utilization is a most exacting one, but, since the values added by processing would top those of any other form of wood processing, the rewards promise to be great.

Exploring distillation, hydrogenation, and hydrolysis processing, the Forest Products Laboratory's wood chemistry staff is attacking problems of the conversion of wood to charcoal, furfural, glycerine, cellulose derivatives, and a number of other industrial chemicals that promise to bulk large in both tonnage and unit value. Rewarding additional research is carried on in fundamentals of adhesion, dimensional stabilization, and in the methodology of chemical analysis.

Beyond these current activities the areas for future research are numerous and challenging in the promise they hold out for a better forest economy.

Wood Residues

One subject that might well be marked "urgent" is wood residues. Here the increasing use of whole-log barkers and fixed and portable chippers has already brought in new significant utilization practices, such as the diversion of woods and mill residues to pulp mills, with great benefit to both the pulp and sawmill people. This advance in technology should be regarded only as a beginning, especially since it has so clearly revealed some obstacles that lie in the way of vastly increased use of residues by pulp mills and other wood converters. Some of the problems have to do with the presence of bark in chipped residues. When tops, branches, small thinnings, and other remainders are chipped in the woods, where they must be handled, the bark is an unavoidable fraction of the chip yield. How to eliminate the bark mechanically, develop pulping methods to cope with increased bark content, or develop new chemical products from bark—these are some of the questions that research must answer soon if the intrinsic value of the wood fiber from residual as well as roundwood sources is to be fully realized. Here lies one approach to adding new values to the side products and residues that result from farm woodlot improvement and harvesting.

During the last ten years the attack on our hundred million tons of forest products residues has been led by the mechanical engineers through the medium of barkers and chippers. During the next ten the chemists have the opportunity to build on these gains and work something like a revolution in forest utilization. The chemical constituents used in producing glycerine, furfural, sorbitol, and other important industrial chemicals are present in wood as they are in the sources from which they are now derived. It is up to wood chemistry to find ways to make existing laboratory-scale methods of making these chemicals cheap enough to compete with these other sources. Then indeed the forest products industries will be on an improved economic base.

Jobs for the Future

Forestry is beginning to grow up in the United States and it is time to consider the cultivated forest, grown not merely in terms of vigorous trees of good forest form producing high wood volume, but in terms of quality wood produced to meet the specifications of predetermined products. Much of wood quality, of course, is influenced by site conditions, but there are firm indications that factors of

FIG. 4. — A careful and thoroughgoing research of the soil block technique is being made in the search for accelerated assay methods for evaluating preservatives to protect wood in service where decay is a hazard.

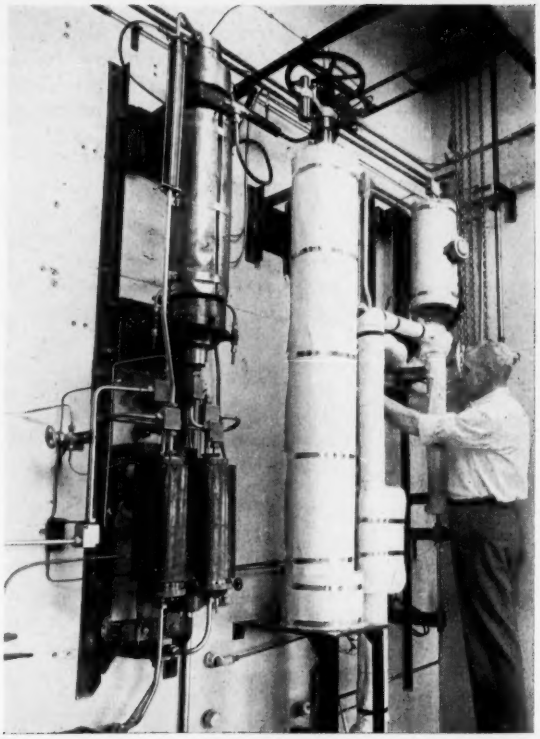

FIG. 5.—This is some of the hydrogenation equipment used at the Forest Products Laboratory in connection with basic research of all available chemical conversion processes that might lead to broad use of wood residues in the chemical industries.

heredity also exist. Certainly the inheritance of poor quality seems apparent where second-growth stands have been consistently creamed of the best trees and the successive crops have continued to deteriorate. Elite breeding stock must be found by research and experiments started toward a wood-to-order concept.

It is time too for research workers to do some radical and creative thinking about the cutting of wood, along the lines of work already started and beyond. It should be possible for research to come up with some method, perhaps a variation of slicing or scoring, by which wood can be cut with less power and maintenance than that given to conventional saws, that is more accurate, that leaves cut surfaces relatively smooth, and that eliminates the great waste that now goes into sawdust.

There is a present trend in the use of wood with other materials that brings with it special responsibility for research. If the special qualities of wood are to be fully appreciated and if wood is to retain a favored place in such composites, the conditions governing its optimum use must be clearly established. Possible combinations include fiberboards, particle boards, paper honeycomb, glass-reinforced plastics, metal sheet, metal foil, and plastic films. Detailed investigations of free dimensional movements, rates of dimensional change, and other characteristics of the component materials as associated with changes in temperature and moisture content will result in valuable basic information. The object is design and fabrication to insure consumer satisfaction and a maintained and more diversified market for wood items.

Additional seasoning research must be initiated soon, since seasoning, so vital in many wood uses, is becoming increasingly expensive. New approaches must be sought both to lower costs and to make seasoning more efficient. This research must include predrier investigations to remove water by forced circulation of ambient air and the use of solar heaters and heat pumps to provide heated air, evaluation of factors that influence moisture diffusion including boundary layer influences, sonic vibrations and aerodynamic aspects of circulation, surface treatments of green lumber to reduce drying defects, and increased automation studies to provide for automatic operation of dry kilns either through program controllers or by electrical conductivity of the wood being dried.

In our consideration of research that needs doing we are confronted with the obvious need for new ways to protect wood against decay. We can no longer be complacent about the fact that certain wood species are difficult to impregnate with liquids. Different approaches involve the use of diffusion processes, infections by

harmless fungi to increase penetrability, modification of anatomical structure of wood or its extractives, and others. We intend to explore some of the unique and promising possibilities very thoroughly. For example, the results of exploratory experiments justify an investigation of cyanoethylation of wood. Cyanoethylation of wood consists of treating wood with acrylonitrile in the presence of a mild alkali and then heating it. A chemical modification of the cellulose takes place whereby the wood becomes immune to attack by fungi. The treated wood is clean, odorless, and free from any toxic materials, qualities not now found in most protected wood.

It is time, too, to depart from obvious cut-and-try methods of research on paints and finishes for wood, since these empirical methods are so rapidly running dry of results and since important markets for wood are tied so closely to the development and marketing of efficient coatings. The need is apparent for more of the studies already initiated on the fundamental chemistry and physics of paint aging and deterioration, and of wood weathering. Such studies should lead to more scientific specifications for the properties that must be imparted to new and improved paints and finishes if they are to protect wood adequately and maintain their own integrity more satisfactorily. Similarly, a departure from former empirical research in inflammability of wood, and a strong fundamental approach are clearly necessary.

We have already implied some research in the pulp and paper field in commenting on the need for better utilization of both agricultural and industrial residues of wood. There are, however, other reasons for pushing research on the pulping of wood into new areas. One of the most obvious of these is already at hand in the cold-soda pulping process. Originally conceived as a process requiring neither elevated pressure nor temperatures in the cooking of wood chips, it is apparent now that the process has a number of possible variations that require exploration, and as they develop intensive work on the more promising. Out of this work may come continuous pulping operations, higher yields, and more facility and profit in using hardwoods. The apparent ease with which success may be achieved with this or any other process should not deter our chemists and chemical engineers from looking further for new and different pulping media and techniques.

The foregoing are a few jobs for the future. The needs for research in the forest products field are great. The opportunities for effective results are limited in breadth and vitality only by our own thinking.

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Distinguished Finn Combines Forestry and Statecraft

The American friends of the distinguished Finnish forester, Professor Eino Saari, will be interested to know of his important, constructive participation in the political affairs of Finland.

Some six or eight years ago Prof. Saari was a pioneer in the formation of the Finnish Peoples Party, a somewhat liberal party appealing especially to middle class people. He became the recognized leader of this party.

The Finnish Peoples Party became more influential than might be inferred from its rather small representation of 13 in the 200-member Parliament. Prof. Saari became Minister of Social Affairs in the cabinet. He resigned from this post last June during a worsening crisis over the proper measures for combatting inflation. Later in the summer Prof. and Mrs. Saari were members of the select group which welcomed Prime Minister Nehru of India on his visit to Finland, and Prof. Saari was his official guide while he was in Finland.

Then the cabinet resigned because of a no-confidence vote in Parliament. Finland is a republic which combines a presidency with a parliamentary form of government. The leaders of several leading parties were successively asked by President Kekkonen to form a new cabinet but they were not successful. Then the President sent for Prof. Saari who had been in Rome for three weeks as head of the Finnish delegation to the Ninth Annual Conference of the Food and Agriculture Organization of United Nations which met in November, and asked him to try. Upon his return to Finland, according to the Swedish press, Prof. Saari, referring to the complexity of the situation, said it was as though he had stuck his head into a wasp's nest. Anyhow he was not successful—according to reports, because of serious disagreements among the major parties and within the Social Democratic Party. This was the final attempt to end the crisis through the normal method of forming a new political government, and President Kekkonen then called upon the Director of the Bank of Finland, Rainer von Fieandt, Finland's "strong man," to form a non-political, provisional government to hold office until the next general election. He became Prime Minister.

Presumably, Prof. Saari is again able to devote the bulk of his energy to forestry. He continues to fill the important chair of forest economics on the Forestry Faculty of the University of Helsinki, a post which he has occupied with distinction for many years. He has also been one of the most active members of the Finnish-American Society in Finland, and chairman of the important Finnish Committee on Study and Training in the United States. During the last decade this committee has arranged for 1,000 Finns to study in the United States.

RAYMOND E. MARSH

TECO Takes a New Look at Wood Utilization

Carl A. Rishell
Vice president,
Timber Engineering Company,
Washington, D. C.

FOR MANY YEARS the wood products industry has been conscious of the need for increased utilization of the raw materials processed in its various manufacturing operations. It has for some time sought new wood utilization processes, but only modest, if continuing, investigations were carried on until a decade ago.

Technical advancements in any industry are best promoted under conditions in which economic necessity becomes the dictator. Often this spur for self-improvement is in the end beneficial and is the principal reason some other natural resources industries have been able to better their marketing conditions, even against apparently insurmountable difficulties.

Not too many years ago our principal wood products held an unchallenged position because for many uses there were no competing materials. This era of well being lasted for a long time and is probably a primary reason for the lumber industry making only feeble attempts to improve itself.

All industries would like to have unchallenged markets, but unfortunately under these ideal conditions they grow fat and lazy. When sufficiently obese, a point is reached where complacency is so complete that nothing short of shock treatments can awaken it.

It is, of course, ridiculous to place one's finger on the calendars of years gone by and state that this is the day, the month, or the year in which the industry began to lose its markets. These losses are matters of evolution and the process may be slow.

About ten years ago the wood products industry entered a perceptible era of integration. This was brought about by intense competition for forest raw materials. The plywood industry had already captured a principal supply of large high grade timber. About the same time there was an expansion in the paper and the hardboard field. The sawmill industries, hard pressed to pay the current price for logs because of declining returns from the sale of lumber, realized that only by integrating or by selling unused raw materials could they bridge the drop in prices for their products. Thus began a period of integrated industry combinations. Some of the companies unable to afford integrated operations found ways of selling their undesired raw materials, but often this was accomplished at a sacrifice of true value.

The success the larger concerns have had with integrated operations has whetted the appetite of the less fortunate in the lumber industry. Various research organizations throughout the country have been flooded with inquiries to help increase forest utilization. Unfortunately many of these questions, even today, cannot be answered satisfactorily.

Participation and Benefits in Wood Utilization Research

An outstanding indication of the interest in wood utilization by relatively small and medium sized concerns is the number that have employed research directors. A few years ago persons trained in wood utilization had a difficult time obtaining positions in private industries. Most graduates in this field secured employment in federal or state wood utilization laboratories.

FIG. 1.—Mats for producing two homogenous type particle boards are being moved into the multiplaten hot press at the particle board pilot plant of the wood products research laboratory of Timber Engineering Company.

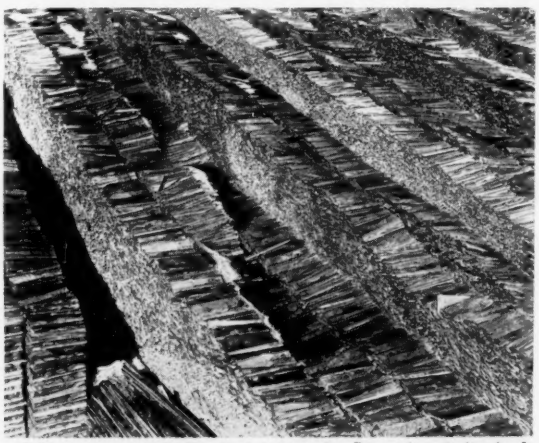

Photo courtesy of R. W. Fischer, Ltd., La Conversion, Switzerland.

FIG. 2.—Stockpiles of slabs and edgings for particle board manufacture stored in Switzerland. To facilitate handling and measuring this raw material is cut one meter long.

But in the past few years the situation has changed and there is a dearth of highly trained and experienced people in the field.

Many companies that employ a research director have no research laboratory or any intention of starting one, but employ a technologist for the principal purpose of keeping them informed of new developments by others. Other companies not only employ research directors but maintain small laboratories and technical personnel who actively engage in product development. A third classification is firms that employ a research director who works on a specified budget to contract for research work in government or private laboratories.

Of course there are many businesses not consciously involved in research that participate in some form of activity in the wood utilization field.

Recent waste utilization studies conducted by the Timber Engineering Company for groups of 30 or more firms are good examples of this type of company research. TECO, as the research-engineering affiliate of the National Lumber Manufacturers Association is popularly known, has undertaken quite a few group research projects.

By and large the entire wood product industry is either actively or passively interested in new wood utilization processes although the present recession has somewhat dampened the spirit, and makes it difficult for research organizations such as TECO to obtain the necessary group participation for its projects. In the writer's opinion this is a temporary situation that will clear up as economic conditions improve.

Is Group Research Valuable?

The success of group research and its value to the participant depends upon two things: first, the attitude of the participant, and his need for technical information. This does not mean that each firm must undertake the construction of plants or processes because the results of a research study indicates that under certain circumstances this is justified. Outside considerations such as financial strength and competitive position are also important to determine whether the recommendations should be put into effect. However, each company participating in a research study should be open minded in determining whether the recommendations fit its operations. Secondly, a successful group project depends upon the integrity, experience, and thoroughness of the research organization conducting the project and that organization's ability to report findings and analyze results. Probably group projects are most valuable in determining whether new markets exist or whether new processes are applicable to the clients.

In determining whether to participate in a group project, management has two principal decisions to make: first, would it be more profitable to undertake the investigations alone rather than in a group and, secondly, is the proposed investigation in the field of paramount interest to the firm?

No one can give the answers to these questions except the management of the firm. However, individual projects are an expensive proposition. For the dollars spent more value can usually be obtained from a group project than from an individually financed project. Furthermore, the scope of well designed group projects are usually sufficiently broad to fit the needs of most firms. Generally even though a firm has undertaken its own investigations, it is often money well spent to participate in group projects to check the validity of data already secured.

There is a great deal of technical data that can be culled from sources readily available to every top executive. Management should have a broad, accurate knowledge of new developments in its own and related industries. Trade journals and technical organizations have done an excellent job of reporting new processes and new industry developments. A great debt is owed to the publishers of these articles. However, it is not usually the intent of the editors to delve into the fine technical aspects of a subject, nor is it their purpose to be the final guide to management.

Advancements in Wood Technology: U. S. versus European

American industry has a justifiable pride in its technical accomplishments. The advances made have been necessary to keep pace with the demands of a competitive economy. American industry has invested tremendous sums of money in research and, when successful, management has had the initiative, ability, and the resources to utilize the results.

To a certain extent this situation also exists in many European countries. But for some reason American industry has better understood its relationship and dependence on the mass consumer than have industries in other nations. Consequently, we have been able to utilize our technical tools to a greater extent than all other nations to produce necessities and luxuries for the man on the street. This we call the American standard of living, which is envied throughout the world.

On the other hand, technical developments in Europe are undertaken more leisurely and sometimes more thoroughly than in the United States. The developments are naturally designed for use in a particular country and for special conditions, which usually differ from ours. However, many years of experience by U.S. industry has indicated that there is a vast fund of information in Europe which when properly treated and applied can be profitably utilized in this country.

In investigating new processes for the utilization of wood, it is essential that investigating teams learn what can be found in Europe as well as in the United States. For most domestic processes, we can obtain information through technical journals and trade magazines, but many of the develop-

Photo courtesy Hosmer Machine and Lumber Co., Cantoocook, N.H.

FIG. 3.—The mechanical debarking cutterhead is one of several means of cleaning logs so that slabs and edgings from the log can be used by paper manufacturers. This practice has grown in the past decade, and has stimulated additional interest in bark utilization.

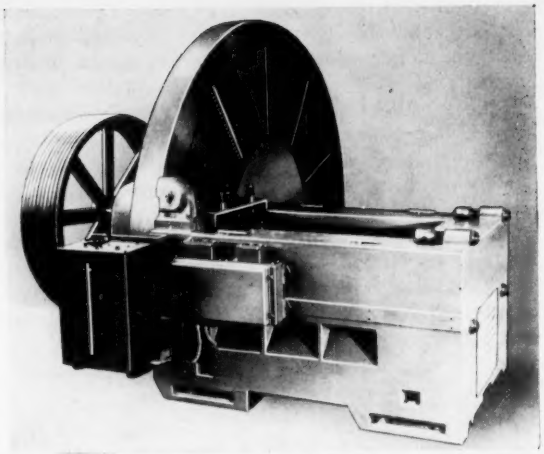

Photo courtesy Industrie-Companie, Drefeld, Germany

FIG. 4.—A recent improvement in particle board flakers is the disc flaker pictured above manufactured in Germany. To the right is a trough which takes wood cross cut to length and drives it by means of three endless chains into the face of the disc, providing a continuous feed operation. Scoring and slicing knives can be seen on the face of the disc.

ments in Europe are not adequately covered in published reports.

TECO's Interest in Foreign and Domestic Wood Utilization

In 1955, one of TECO's clients was considering the purchase of an additional lumber operation. In its investigations, this firm was convinced that, due to the locality, the type of timber and other economic factors, the purchase would be an unsuccessful venture unless it could be integrated with other manufacturing processes. Hardboard, particle board, and paper were considered as the principal integrating factors. TECO's client was well informed on hardboard developments in the U.S., but was not satisfied that the processes in use were the best for its own particular needs.

The Timber Engineering Company was asked to conduct a survey in both the U.S. and Europe to determine what wood utilization processes were available. Estimates indicated that a thorough investigation would cost approximately $50,000. Although this firm could well afford the investment, it was believed that many other firms would be interested in the same subject, and that a group survey of wood utilization practices would be of value to all.

The Timber Engineering Company selected 25 companies that had expressed interest in a similar study. These companies were contacted and the necessary funds obtained. In the spring of 1955, TECO sent out two teams of specialists, one to Europe and the other through the United States, to compile information on the most outstanding processes on both continents.

The scope of the 1955 project was broad. Investigators were not under a mandate to confine their efforts to any single process. Generally the investigating teams specialized in searching out all available data on small production pulping processes, hardboard and particle board processes, mechanical and chemical waste utilization processes, and new developments in debarking and chipping.

In covering European developments, more time was devoted to German wood utilization processes since this industry had made the most dramatic advances in this field. Utilization techniques in Britain, Switzerland, Austria, France, Belgium, The Netherlands, Denmark, Sweden, and Norway were also studied and found to be important.

The European team started with a five-day visit at the Hannover Industrial Fair. This was an excellent beginning for in Hannover the investigators met the principal industrialists in Germany and some from other European countries. Literally mile after mile of machinery was examined and evaluated. Probably in no other place in the world can an exhibition of this magnitude or specialization be found. Anyone making an investigation in Europe in fields such as wood utilization will find that a few days at the Hannover Fair is time productively spent. Not only can equipment and processes be examined, but it is possible to talk with key industrialists that otherwise would be difficult to contact.

Industry in Germany is a strange mixture of ultra-modern and antique, and was of particular interest to us. Industrially Germany is brand new, newer than the United States. Experimentation with many new and different procedures and processes is being tried. This writer found the nation dynamic in its determination to secure industrial pre-eminence.

We found German hardboard production had leveled off, whereas in the United States hardboard processes and plants were expanding tremendously. German forests and raw materials are so different

from ours that developments in debarking and chipping were not considered very important in our studies.

However, the German particle board industry had advanced rapidly, far beyond any conception which we had in this country. The products from their plants, even in 1955, compared favorably with the finest quality boards being made in the United States today, and were in general far superior to those we were producing in 1955. The equipment for manufacturing particle board in Germany is designed particularly for use with their own raw materials. Thus, without modification, some of the equipment is not usable in this country. It was amazing, however, to learn of the advanced development and excellence of this new industry.

Another outstanding development in Germany was in the manufacture of molded products. In this field the Germans are somewhat below the technical advances made in the United States but they have many procedures and some fine equipment which, with modification, would be applicable in this country.

In Switzerland, we found a duplicate of the efforts of the Germans. Particle board was again the principal story. The Swiss have specialized in producing products using Portland cement and wood waste.

In France, Belgium, Holland, and Denmark, we did not find too much new information in our particular fields. One exception was processes using cement excelsior and cement wood chips or flakes for building products. The plants producing these materials were very small and, although somewhat similar, were more crude than the conventional cinder block plants in the United States.

In Sweden and Norway we found large scale pulping processes. Small processes, which were of particular interest to us, were practically nonexistent. In these countries we found that the particle board industry had not yet taken a foothold. However, in both Sweden and Norway, we found that hardboard processes had developed rapidly and that many plants and equipment developed by the Scandinavians could be used without change or modification in the United States. The product produced in these countries is different from United States products, but not necessarily inferior. The equipment used and the efficiency of the hardboard plants in these countries should be of tremendous interest to United States industry.

Debarking Processes

One of the most outstanding pieces of equipment we saw in Scandinavia during our 1955 investigations was a Swedish machine for debarking logs. This equipment, probably due partially to our report, has since been widely used in the United States.

There were other companies investigating and building prototypes of new debarking equipment. These had promise and the prototypes were in some cases quite advanced, but it is doubtful whether the firms engaged in this development have the financial resources to produce machinery for U.S. consumption.

In Norway, we found new processes for sawdust utilization, a new hardboard product, and considerable work being done on the use of Portland cement as a binder for wood waste aggregates. One firm engaged in this latter work sold nearly all of its products in Africa. It produced building blocks similar to our cinder blocks, and a panel type material from which a wall unit could be constructed. A single panel constituted the exterior surface and the other side was decorated for the interior wall. This firm provided a complete engineering service for its customers. The design, manufacture of materials, and construction of a structure, or even an entire town, was included in this service.

Results of the Survey

The initial 1955 survey was an outstanding success. A report of almost 400 pages was produced, covering both domestic and European utilization methods. The investigation took approximately five months and included tests of some of the samples of domestic and foreign materials. At the conclusion of the project the Timber Engineering Company held a meeting of its clients. A group of European equipment manufacturers was invited to attend open forum sessions, to meet with clients and advise them regarding their products.

Quite a few plants have been built as a result of these investigations and a good bit of equipment has been sold as an indirect result. We believe that this initial 1955 work was at that time the most complete investigation in this field.

For a private concern to accumulate, on its own, similar information, would have cost at least $50,000 and it probably would not have obtained any more thorough or valuable information. Through the group survey participating companies received this information at a fraction of the total cost of the project.

Succeeding Investigations

The results of the 1955 investigation were so outstandingly successful that the clients requested another investigation in 1956. However, particle board had developed to such a point that we were asked to specialize in this particular field and to give the broad field of wood utilization only passing scrutiny. In 1956 Finland was included on our itinerary but the Low Countries, France and Austria, were not included since all information thought to be of value had been studied the previous year.

We found in Finland that the principal activities were not too dissimilar from those in Sweden and Norway. We visited several Finnish plants that were producing doors, windows, and other millwork for Russia. In one plant, we saw door assemblies in which the frame, the door, and all hardware were shipped as a completed unit. The procedure and the product were different from anything

available in the United States and, with certain modifications, could probably be made useful here.

In 1957, a third project was conducted, but only Germany, Switzerland, and Great Britain were selected as targets. In all three investigations, British processes were investigated. Some of their developments in the particle board field were outstanding. The British interest in continuous forming and pressing of particle board bears close watching by United States board manufacturers.

What for the Future?

Undoubtedly the American wood products industries have progressed considerably in the recent past. The progress in ten years has been greater than in the preceding 30 years. Still our markets are being threatened from every side. We cannot retain every market, nor can we hope to, but every outlet lost should be more than replaced b ynew ones. Through process and plant integration and research we should find our answers.

In this connection it has been stated that small plants, particularly in the West, will be most affected bv their inability to integrate. This is probably not true, for in the future, as in the past, the small operator will probably participate in the lumber industry when business is good and turn to other fields of endeavor when economic conditions are adverse. Likewise, the large operator should not suffer too much for he has sufficient resources to integrate.

The medium sized operator will face the greatest difficulties. To purchase timber in competition with integrated plants he must find a way of using a large proportion of the log. Integration is expensive in terms of capital investment, often more so than can be afforded.

For the foregoing reasons the complexion of the lumber industry is changing. We need not worry too much about the overall forest industries, but it will not be the same tomorrow as it is today, and those who wish to stay in business will have to change with the times. The lumber industry has problems, and it recognizes them. Most of these problems can be solved but will take ingenuity, capital investment, salesmanship, and technical progress.

Can Wood Utilization Surveys on a Group Level Be Helpful?

There is no doubt about the adequacy or the effectiveness of these surveys when properly conducted. If properly used by participating management they will form the basis for an overall program of integration and development. No survey of this type will replace technical investigations in the laboratory, but very often the processes which are discovered through these studies will limit the amount of technical investigations required and in a few instances may provide all the information that is needed.

The Timber Engineering Company will continue utilization surveys on an annual basis. There will, of course, be some repetition. We cannot always expect to find as many new developments as we have seen in the past five years. Technical progress is relatively slow, but it is the little raindrops which when added together constitute a satisfactory rainfall.

The day is not too distant when the wood products industry will no longer be able to afford the luxury of waste. We are now approaching the time when the title of these projects will be changed from waste utilization surveys to utilization surveys. Only a few years ago even the largest manufacturing operators utilized only slightly more than a third of the tree. Today, many operators utilize, in one way or another, every bit of the log which comes to the sawmill.

Through industry integration, new utilization processes, product research, and improved methods of raw material transportation, the lumber and wood products industry can expect to develop more efficient operations which will benefit the economy of the nation and assure its own perpetuation.

The Proceedings of the Hardwood Sawlog-Grading Symposium sponsored by the Central States Section in Indianapolis June 10 and 11, 1957 have been published jointly by the University of Illinois and Purdue University Agriculture Experiment Stations.

A number of points were discussed during the two-day program, and an attempt was made to reach a common basis of agreement on many of the points. The following six points passed a majority vote by the conferees:

1. There is a real need for a quality judging technique for hardwood logs and trees.

2. The grading or judging scheme should be based on recovery of 4/4 factory lumber.

3. The grading scheme should cover all logs from best to poorest.

4. Forestry schools should give instruction in the reasons or importance of quality grading.

5. Research workers need as accurate and precise a system of grading as is possible to obtain.

6. For field application by practicing foresters and lumbermen the system should be as simple or fool-proof as the required limits of accuracy permit.

About 50 persons attended the meeting. Fourteen states were represented by attendees from federal agencies, universities, private agencies, and by state agencies.

Only a limited number of copies of the 105-page publication have been prepared for general distribution, although copies were sent to SAF Sections, forestry schools, forest experiment stations, state foresters, extension foresters, and to 22 foreign addresses.

C. S. WALTERS
University of Illinois, Urbana

The Institute of Paper Chemistry

Irving H. Isenberg
The Institute of Paper Chemistry,
Appleton, Wisconsin

THE Institute of Paper Chemistry, located in Appleton, Wisconsin, was chartered by the State of Wisconsin in October 1929, and is affiliated with Lawrence College, a liberal arts college of high caliber, chartered in 1847. Conceived as a partnership between industry and education in a graduate school to train men in the basic sciences and technologies applicable to the pulp and paper industry, the Institute was initiated through the efforts of a group of Wisconsin pulp and paper industry executives and the trustees of Lawrence College. The second objective of the founders of the Institute was to provide a research center, where the latest scientific equipment and knowledge could be accumulated and made available to the industry and where research could be conducted in both fundamental and applied problems. A third aim was the establishment of a comprehensive research library which would be a central reservoir of information for the industry as well as the students and staff and so serve the academic and research objectives.

Although the Institute was founded by Wisconsin industry it was fully expected that some day it would be national in scope. This belief has been justified and the initial support provided by the companies of the State of Wisconsin has been extended until at present pulp and paper mills in 34 states are members of the Institute, which is restricted to manufacturers of pulp and/or paper in the United States. The direction of the organization is vested in a Board of Trustees comprised of leading executives in the pulp and paper industry, with John G. Strange as president of the Institute. The president of Lawrence College is ex-officio member of the board and chairman of its Academic Policy Committee.

Though endowments for the library, scholarships, and special facilities have been created and continue to grow, The Institute of Paper Chemistry does not have a general operating endowment. Growth and continued annual support for the Institute was anticipated, as its work was directed toward the purposes for which it was founded and as its effectiveness was demonstrated by its achievements. Additional financial support is received through annual scholarship gifts from individuals and companies, through income derived from patents resulting from Institute research, and through funds obtained from the contractual relations existing between the Institute and member mills and various companies in allied industries.

Educational Program

The course of study at the Institute consists principally of concentration in selected areas of chemistry, physics, and chemical engineering with the application of these fields to fundamental industrial processes. The responsibility for the educational program rests with the dean of the Institute with the cooperation of the other members of the faculty. For academic purposes members of the staff who are on the faculty are grouped into departments of chemistry, chemical engineering and technology, physics and mathematics, biology, and general studies. These groups have representatives on the academic council, of which the dean is chairman.

The first class of students was admitted to The Institute of Paper Chemistry in February 1930. The degree of Master of Science was first awarded by Lawrence College in June 1931, and the degree of Doctor of Philosophy in June 1933. Since the academic program was initiated, students have been admitted from 39 states and 110 different colleges and universities. To make effective use of its resources and to achieve educational objectives, the size of the entering

FIG. 1.—View of the Institute of Paper Chemistry at Appleton, Wisconsin.

FIG. 2.—View of pulp and paper testing laboratory at The Institute of Paper Chemistry.

class is limited and the students are chosen by a rigidly selective system. The Institute alumni are located from Maine to California and from Washington to Florida, and even in India, for a small percentage of foreign students may be admitted at their own expense if they are qualified.

Research Program

The Institute holds that a vigorous research program vitalizes graduate education and brings the Institute closer to its membership and the activities of the industry. Consequently, in addition to the academic research by students, fundamental and applied research is conducted by staff members through projects initiated by the institution and financed through general institutional funds. Another type of research carried out solely by the staff is cooperative research; specific projects are undertaken on a nonprofit financial basis on behalf of either individual companies or a group of companies. Contributing to these extensive research functions is a total staff of 250 persons, which includes, in addition to the faculty, specialists and trained personnel representing the physical and biological sciences and the technologies related to the paper industry.

In addition to the many scientists and technologists coming to this area from other countries for meetings or short visits, scholars from England, India, Austria, Finland, Sweden, Japan, Australia, and New Zealand have recently engaged in fundamental investigations and post-doctoral studies at the Institute through grants or special appointments.

Six major buildings erected exclusively for the work of the Institute are located on its campus of 32 acres. The buildings and equipment are appraised to be in excess of $3,750,000. The total working space is nearly 175,000 square feet. In addition, there are two dormitories for single men and eight dormitory apartments, each with four units, available for married students and their families.

The library contains more than 20,000 volumes in sciences and technology related to pulp and paper. The library currently subscribes to 300 scientific and technical periodicals. It also has copies of about 33,000 United States patents on pulp and paper manufacture and related topics as well as a complete file of the *Official Gazette* of the U. S. Patent Office and of the *Canadian Patent Office Record* since 1920. This specialized collection of scientific and technical literature is generally regarded as the most complete in the field of pulp and paper.

The Institute, through the library, publishes a monthly bulletin, *Library Notes*, which provides abstracts of all current articles in the field of pulp and paper. This publication is received regularly by universities, research centers and institutes, and pulp and paper mills throughout the world. Publication of this service was begun in September 1930.

The Dard Hunter Paper Museum has been located at the Institute since 1954. This collection contains thousands of specimens of early handmade papers, watermarks, and oriental decorative papers, as well as many rare books and manuscripts showing the evolution of papermaking and the introduction of science to the craft. Also on display are tools, appliances, and scale models of equipment from all parts of the world for the making of paper by hand.

For research purposes the technical staff is organized into groups whose primary concern is fundamental research and sections which devote most of their attention to applied research although in practice there may be considerable overlap if occasion demands. The groups at the Institute are lignin chemistry, wood technology, cellulose chemistry, biology, carbohydrate chemistry, physical chemistry, physics, analytical chemistry, and chemical engineering. The sections are pulp and papermaking, special processes, paper evaluation, container, and graphic arts.

To acquaint the reader with the scope of our research possibilities the following paragraphs describe briefly the various laboratory facilities of the Institute.

Chemistry. — Extensive laboratories are available for research and development in the many aspects of chemistry. Facilities for organic research include chromatographic equipment and a high pressure hydrogenation apparatus for the study of wood, pulp, paper, and related materials. The analytical laboratories are fully equipped for work in the fields of wood, pulp, paper, raw materials, and process liquors. Equipment is available for conductometric and potentiometric titrations, colorimetry, ultraviolet and infrared spectrometry, and qualitative and quantitative microanalysis. The physical chemistry laboratories are equipped for study of the surface area and surface energy properties of cellulose and other natural and synthetic high polymers. Apparatus is also available for studies in the fields of polymerization, molecular weights, particle size, distribution, surface films, adsorption kinetics and equilibria, colloid chemical properties of pigments and adhesives, rheology of solutions and suspensions, emulsification, foams, flotation, detergency, and sizing, filling, and coating of papers. There are also well-equipped radiochemical and x-ray diffraction laboratories.

Chemical engineering. — The chemical engineering laboratories provide facilities for studying many of the unit operations and processes of chemical engineering. In addition to the laboratory investigations, studies often progress into commercial equipment in full-time operation in the industry.

Physics.—The physics laboratories includes a spectrograph, an electron microscope, a spectrophotometer for the determination of colorimetric data, and a laboratory for the standarization of reflection meters in the paper industry. There is a variety of electrical and physsical appartus including some of the more useful electronic devices, optical equipment, sources of ultraviolet light, and items generally employed in physical research.

Plastics.—The plastics laboratory

is equipped for research and development involving the use of resins with pulp and paper, evaluation of materials as plastic products, and the impartation of special properties to paper. The work in these fields is concerned with coatings, impregnations, adhesives, laminates, loading powders, waxes, and stock additions.

Biology.—The biology laboratories are equipped for the investigation of problems in aquatic biology, entomology, and microbiology. Additional facilities are available for carrying out genetic studies of pulpwood species.

Pulping and papermaking laboratory. — The pulping and papermaking laboratory contains complete equipment for small-scale pulping, bleaching, and stock preparation. Facilities are also provided for complete pulp evaluation and for those papermaking operations that can be studied on a handsheet basis. The container building is devoted entirely to research and development work on the design and testing of paperboard and containers. The graphic arts and paper evaluation laboratories are equipped with the standard humidity room for testing, rooms which permit considerable fluctuation in humidity and temperature conditions, as well as rooms where graphic arts studies may be performed.

Wood technology.—The wood technology laboratories are equipped for research in the structure and important properties of fibrous raw materials. A fiber microscopy laboratory provides for the microscopic identification and analysis of fibers.

It is natural that The Institute of Paper Chemistry should be interested in the nature and properties of wood in both the academic and research programs, since wood furnishes more than 90 percent of the fibrous raw material used in the pulp and paper industry in the United States. A course in wood anatomy was included in the first curriculum, and the wood technology group was organized in 1940.

Wood technology has been defined as the study of the technical properties of wood, i.e., those which influence its utilization, and is logically divided into the fields of anatomy, physics, and chemistry. Several of the groups and sections of the Institute merit further consideration from the wood technology research point of view.

Before proceeding with the discussion, however, it seems desirable to point out that we have been interested in the growth of trees for many years. Since 1940 small plantations of various species (chiefly coniferous) used in pulping, and able to grow in our climate, have been planted on our property. These trees have been used for phenological studies as well as growth and survival studies. Recently, a research program in forest genetics has been initiated, particularly in the triploid condition in trembling aspen, although our efforts are being extended to encompass other species.

Review of Wood Technology Research

Perhaps the best way to review the pertinent research of the Institute is to mention various programs conducted in the field of wood technology and also some of the publications.

FIG. 3.—Example of modern research facilities is this electron microscope at the Institute of Paper Chemistry.

Anatomy.—In wood anatomy the Institute has conducted studies on the structure of the cambium zone, inner bark, and outer bark of several species, on the length of unbroken fibers of softwoods and hardwoods, on the morphology of papermaking fibers for identification of species in pulps and papers, on the chemical identification of wood, and on the physical nature of the cell wall by means of swelling studies as well as electron microscopy. A brief list of publications resulting from such studies related to wood anatomy follows: "Anatomy of redwood bark, pulpwoods of the United States and Canada, comparison of the springwood and summerwood fibers of Douglas-fir, fiber measurements of tropical wood fibers, location of extraneous materials in redwood, the influence of humidity on changes in diameter and length of sulfite pulp fibers, a fundamental study of the nature of fiber staining by iodine stains, the effect of digestion on wood structure, changes in the structure of wood fibers during cooking and bleaching, and the existence and nature of fiber membranes."

Physics. — In the area of wood physics, studies have been made on the penetration of liquors into wood, the change in strength of wood during pulping, the strength of individual fibers, moisture relationships, and fiber-to-fiber bonding. Representative publications have been: "Relationship between delignification and strength characteristics of very raw pulps, rheology of cooked wood, penetration of water in insulation board, an investigation of the adsorption of gases by wood and its components, and a study of the fluorescence of wood and the extractives of wood."

Chemistry. — As might be expected, The Institute of Paper Chemistry has made a great number of investigations on the chemical nature of wood. There has been considerable interest in the nature of the formation of cells by the cambium, the chemistry of cellulose, the chemistry of lignin, the nature of the extraneous compon-

ents of wood, the chemical composition of bark, the analysis of wood and the development of techniques for wood and pulp analyses. Representative publications concerned with such fields of interest have been: "The methanol-extractable aromatic materials in newly formed aspenwood, the phenolic and carbohydrate materials in the newly formed tissues of aspenwood, the inner bark and cambial zone of black spruce, the chemical nature of Douglas-fir lignin, the nature of lignin from western hemlock, the nature of the polysaccharide hydrolysis in black gumwood treated with water at 160°C., a study of tall oil from green and seasoned slash pine, a study of the low-molecular weight phenols formed on the hydrolysis of aspenwood, separation of wood extractives into simpler components, chemical nature of redwood tannin and phlobaphene, a new polysaccharide from black spruce, the ether-soluble extractive of black prucewood, isolation of pectic substances from softwoods, the properties of wood tannins and related materials, occurrence of *d*-pinitol in red spruce, extractives of aspenwood and bark, color precursors in spruce and western hemlock wood and inner bark, the chemical composition of balsam fir bark, the nature of the lignin in redwood bark, chemical composition of redwood bark, analysis of some fractions of slash pine bark, the preparation of aspen holocellulose and chemical study of its fractions, chemical analysis of black prucewood, chemical analysis of green loblolly pine, a comparison of ancient and modern sequoia wood, summative analysis of quebracho wood, chemical composition of tropical woods, analysis of tupelo woods, quantitative isolation of hemicelluloses from coniferous woods, chlorite holocellulose, the maceration of woody tissue with acetic acid and sodium chlorite, physical and chemical characteristics of "skin substance," and a color reaction of wood with methanol hydrochloric acid."

Pulping.—The pulping of various fibrous raw materials has been of paramount importance to the Institute. Some of the published work on the pulping of wood has been: "The sulfite pulping of Douglas-fir, the suitability of various southern hardwoods for kraft pulping, the kraft pulping of southern tannin-rich woods, the effect of tannins on alkaline pulping, redwood as a potential source of pulp, an alkaline process for obtaining high yields of pulp from aspenwood, the relation between chip length and uniformity of delignification in sulfite pulping, and many others dealing with special processes, bleaching, and refining."

Publications—Past and Future

The discussion of the previous paragraphs concerns research of a publishable nature which the Institute has undertaken since its inception in 1930. The first technical article, the combined effort of a staff member and a student, was published in December 1930. There have been a large number of other publications from the Institute which are not germane to our topic; in fact, there have been more than 1,000 articles in all branches of the field of pulp and paper. The present trend of increase in size of student body and staff portends even greater activity in all phases of research at the Institute.

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"Mountains of Hardwood"

In an effort to improve the utilization of hardwoods, the U. S. Forest Service, in cooperation with other forestry and economic development agencies, several years ago initiated a hardwood utilization program in the eastern states. A principal feature of the program is the preparation of brochures designed to publicize the availability of hardwood timber and its utility value in the manufacture of useful products.

The first brochure in the series was entitled *Micova* and was published by the New England Council in April 1956. It pertains to the Middle Connecticut Valley in Vermont, New Hampshire, and Connecticut. The second, entitled *Green Gold* and applicable to eastern Kentucky, was published by the Kentucky Bankers' Association in October 1956.

A third brochure has now been printed and is being distributed by its sponsor, the Virginia Division of Planning and Economic Development. It is called *Mountains of Hardwood* and refers specifically to a seven-county area in the southwest triangle of Virginia. The brochure points out that the hardwood stands are capable of supporting far more timber based industry than is currently operating in that part of the state. It is estimated that the present harvest can be safely increased by at least 300,000 cords of wood and 16,000,000 board feet of sawtimber. Labor, water, transportation, power, and other economic factors are adequate for the establishment of additional industries.

Copies of this prospectus may be obtained by writing the Virginia Division of Planning and Economic Development, State Office Building, Richmond. Participants in the preparation of the brochure other than that Division and the U. S. Forest Service included the Virginia Forest Service and the TVA Branch of Forestry Relations.

Wood Preserving and Changing Markets

R. L. Osborne
American Wood Preservers Institute,
Atlanta, Georgia

THE LUMBER INDUSTRY is now in the midst of more changes than have occurred in it at any time since Noah built the Ark. The revolution in the use of all types of building materials is affecting traditional uses and markets for lumber. The growing use of pressure treated lumber is but one of many facets which indicate that the industry is adjusting itself to changing conditions. Marketing opportunities are centered in the construction industry which utilize approximately 70 percent of all lumber produced and which includes home building, the largest single market. Success in applying modern merchandising methods promises to bring long-term benefits to everyone from the tree farmer to the house buyer.

Lumber Marketing Practices

Major changes in the wood economy of the nation are bringing about a new approach to traditional concepts of lumber merchandising. For over three hundred years the lumberman's main competition has been from the sawmiller across the road and other lumbermen in the area. Advertising campaigns emphasizing species characteristics brought results because in planning new construction it was usually only a question of what kind of wood to buy. Technical developments within competing industries have changed the competition to another direction. Competition from aluminum, plastics, steel, concrete, and ceramics are superimposed upon competition within the industry. For this reason expenditures for wood promotion *per se* are likely to bring the quickest results in developing expanded markets, and winning back others that have been lost, temporarily, to competing materials.

Changes in marketing practices which have already affected most other basic industries are setting precedents for the lumber industry. For example, in the field of consumer education, other industries have by necessity adopted national advertising and mass educational techniques as a means of inducing the public to buy their products. The food industries set the pattern many years ago. The modern store keeper is the supermarket manager whose main asset is his ability as a personnel supervisor, and the marketing organization which stands behind the products he sells. The groceries are actually sold by persons such as Betty Crocker on TV, and through the various other mass educational media. So too the retail lumber dealer is placing increasing dependence upon the manufacturers merchandising organization to tell the public why they should be buying lumber. Even though a retail dealer makes a determined effort, his talents need to be supplemented by industry-wide promotional efforts to acquaint the public with the lumber items which he carries in stock.

To be sure there are many excellent merchandising programs within the lumber industry but much of the construction lumber being sold today is being merchandised with much the same approach that has been used for 200 years or more. Traditional patterns of lumber marketing tend to perpetuate themselves. Accumulation of market research data, however, may well upset some long-standing concepts on how to promote lumber sales. A recent announcement by the president of the National Lumber Manufacturers Association of plans for a $1¼ million promotional campaign indicates that the industry is fully aware of the needs and opportunities that an enlarged promotional campaign offers.

Excellent qualities of wood as a construction material are well known within the lumber industry. They are not so well known, however, by the present generation of home buyers, builders, and designers who have grown up with very little education as to the capabilities of wood construction and its proper use in building. Instead they have been exposed to a barrage of information on all kinds of competitive materials which have been given product publicity on radio, TV, and in the press. Market analysis will reveal those areas where the superior qualities of wood will make it compete successfully and where promotional dollars will bring the quickest returns.

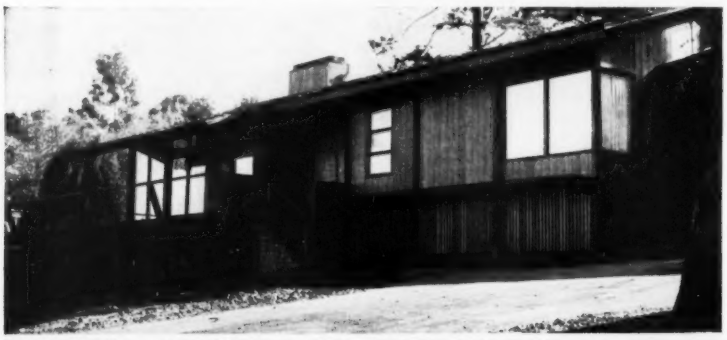

FIG. 1.—Walls, roof, and floor of this all-wood Woodside, California house are supported by 40 Douglas-fir poles. Elimination of a conventional foundation produced an estimated saving of $5,000 in its construction. All wood is pressure treated to provide permanent protection against wood deterioration.

Declining Use in Homes

Housing Characteristics, published by the Bureau of Labor Statistics and the *Stanford Report* show clearly what is happening to

the use of wood in construction. The Bureau of Labor Statistics shows that slab-on-ground type of construction increased to 16 percent of all houses built in the U.S. during the first quarter of 1956; the proportion in the South is shown to be 31 percent. This means a market loss of at least 224,000,000 board feet for floor structures alone in 1956. The *Stanford Report* shows a declining trend in the average amount of lumber used per unit of new construction and indicates that the trend is expected to continue.

In estimating future trends, the *Stanford Report* assumes that there will be no radical advances in technology, etc. Expanded promotional efforts or the extended use of preservatively treated lumber could easily improve the future outlook of wood in home construction.

Preservatives a Solution

The cost of using wood determines its markets in the long-run. The Building Research Advisory Board report, and American Wood Preservers Institute report, "America Needs New Housing Standards," show that the damage from decay and insect attack are steadily increasing. The AWPI report shows, in addition, that much of the increased damage is due to changing architectural styles. Without adequate information, the misuse of wood in construction raises its costs and results in pricing itself out of the market. The AWPI report shows further that preservative treatment will promote high quality construction and help insure the continued use of wood in new home building.

High quality construction implies low maintenance costs, long service life, and high resale values. Designers usually plan a house for a service life of 40 years or more, current financing practices assume a productive life of at least 25 years. Good quality construction in a new house is largely a hidden value, that needs extensive preselling to assure being included as a specific value in the sale. Lacking information on fundamental construction value, real estate salesmen must rely upon price appeal, convenience items, and superficial features to sell a house. Without adequate background information, the buyer is equally at a loss to judge the value of construction features, or to ask leading questions. While quality construction features are more or less intangible in the first sale, they become very specific values within 4 or 5 years when a house begins to show its age. Quality construction then begins to reveal its true value and becomes a most important factor in resale value of the house.

Builders naturally are skeptical of adding features that add to the price of a house without a more than proportionate increase in sale price. Reluctance to use good quality grade-marked lumber or preservatively treated lumber is due only to a lack of public education. This is proved by large increases in the use of aluminum windows, combination doors, and other housing components, which shows that buyers are willing to pay higher prices if convinced they are getting better real values. Builders are in the same position as retail lumber dealers. The builder wants to sell a completed house at a specific price, with the lowest possible down payment. Component manufacturers are expected to presell the equipment or quality features that he includes.

FIG. 2.—This 10 year old house in Coral Gables, Florida exemplifies the outstanding qualities of wood in a modern home. Built in an area of very heavy incidence of decay and termite attack, today's excellent condition is evidence of the protecting qualities of using pressure treated wood under such conditions. All wood including siding, trim, etc., has been treated, upkeep costs have been limited to painting.

The AWPI is now in the fourth year of an expanded program to inform consumers, potential consumers, designers, and builders of the advantages of using preservatively treated wood. Fundamentals concerning the use of preservatively treated wood have been known for a long time. They are the same whether we are considering the use of wood for industrial construction, on the farm, or in residential construction. We know, for example, that when the moisture content of wood exceeds 20 percent, it becomes subject to decay. Also that when structural lumber is placed in ground contact, or near to the ground, it is subject to attack by both subterranean termites and decay. We know further that when wood is properly impregnated with a specific amount of an approved preservative under pressure in a closed cylinder, that it is permanently protected against the dangers of decay, subterranean termites, dry-wood termites, and wood borers.

The economy and long life of pressure preserved lumber and timber has been recognized for many years by quantity buyers of telephone poles, railroad cross ties, and fence posts. The need for using preservatively treated wood where hazards exist in building construction is even greater, because of the high values involved. The urgent need for adequate information on the amount of damage caused by decay and termites in housing, and necessary preventive measures, led to an extensive housing survey made by the AWPI, in cooperation with the Building Research Advisory Board and the Federal Housing Administration. The Institute investigations included over 5,000 houses from California to North Carolina, and south to Florida and Texas. Wood deterioration is known to be most serious in southern coastal areas. For this reason results of the survey show more serious damage than would be expected in central and northern states. In the course of the survey,

Institute engineers visited new and older housing units. They interviewed and obtained opinions of building officials, architects, builders, home owners, and others associated with home building.

Acute structural damage by both decay and termites was found in homes that have been built with untreated lumber within the past three to 15 years. Severe deterioration is not confined to older homes. In some of the newer housing developments high percentages of the houses had suffered serious damage, and had required expensive maintenance or restoration work. In one housing project in Texas some "young" homes had been abandoned and allowed to revert to the mortgage holder because they were beyond repair.

Today's new homes are built close to the ground, with considerable structural lumber contact with masonry. Others are slightly raised, with crawl spaces between the earth and the substructure. Design of many modern homes makes it practically impossible to keep framing lumber more than a few inches away from the soil. That is where the hazards occur. Unfortunately, structural errors disclosed in the AWPI survey are being perpetuated in new houses being built today, to the apparent unconcern of financing agencies and all others who may be involved. These observations are not intended as criticisms of builders and others, because the conditions cited are the outgrowth of practices that have prevailed for years. Rather, the writer is fully sympathetic with the problems of promoting a high quality product. It is a problem which now confronts wood preservers, and at one time or another has confronted every major industry in the U. S. A realistic appraisal does, however, serve as a basis for planning future programs.

The investigations showed that the possibility of attack by wood-destroying organisms can be reduced to satisfactory minimums in houses by limiting preservative treatment to the danger zone, which includes the substructure and wood exposed to the elements. Specific recommendations were classified by type of construction and regional differences in decay and termite hazards. In general, wood in contact with the ground or within 24 inches of the ground, or in contact with masonry should be pressure treated. Typical components included items such as joists, sills, plates, subflooring, furring strips, studs, porch steps, and porch decking. Recommendations included treatment of all millwork in accordance with the wood preservation standards of the National Millwork Manufacturers Association. In climatic conditions of subtropical and semi-tropical areas such as Florida, southern California, and the Caribbean area, pressure treatment of all structural lumber is recommended because of the year-round conditions favorable for decay and termite attack, and the additional hazard of dry-wood termites that exist in those areas.

Costs

The investigations included 759 houses wherein pressure treated lumber had been used for some components during construction. These houses showed that properly treated wood is immune to wood destroying fungi and termite attack for full life of the structures. Also that the initial investment for wood preservation had been returned either through increased resale values or elimination of costly repairs and restoration expenses.

Where pressure treated lumber is being used in quantities to afford adequate protection, the additional investment for wood preservation ranges from one to 1½ percent of the value of a house. Actual costs vary with geographical location, amount of wood used, and type of construction. In cases where the builder decided to obtain complete protection by preservative treatment of all structural members, the cost range is from 3 to 4 percent of the value of a house.

Current business practices necessitate that insurance against fire, flood, and storms be included in the finance package for a new house. When pressure treated wood is used in the original construction its cost is included in the financing and amortization amounts to about one-fourth the cost of insurance for other types of catastrophic losses. Protection is more important for low cost homes, where young people or others living on limited income are unable to withstand the costs of unforeseen restoration or expensive maintenance.

During the past three years the writer has had the opportunity of talking personally to over 3,000 designers, builders, home owners, building officials, users and potential users of all types of wood. In some cases the users have been critical of wood in situations where it has not performed as expected. Fortunately these are situations which can be remedied with proper educational programs. In the great majority of cases the opinions expressed by users have been most encouraging. Women like wood houses, they are cool in the summer and warm in the winter, wood floors are resilient and easy to walk on. In cases where preservatively treated wood has been used, home owners and maintenance engineers were most enthusiastic about its economies and abilities to prevent costly maintenance. The interest displayed showed that our industry is on the right course, and that wood preservers together with lumbermen can look forward to expanding demand.

The place of wood preserving in the marketing of lumber is being publicized by the Institute in its official publication *Wood Preserving News*. This is circulated among more than 18,000 designers, and major users and potential users of lumber. Feature stories are also prepared for publications in special fields. Nine district engineers maintain contact with users and provide consulting and educational activities in behalf of wood concentration. Expanded activities are already showing results in the increased use of preservative treated wood in farm and in building construction.

Future Outlook

Potential markets listed in *Timber Resources for America's Fu-*

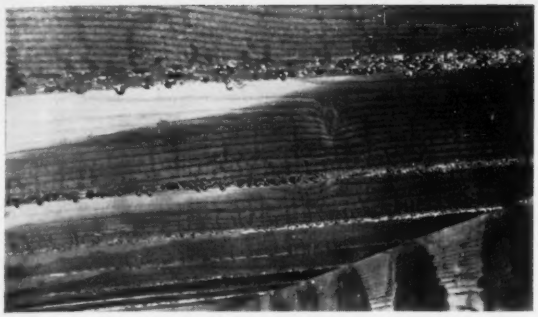

FIG. 3.—Moisture condensation on joists and sill of a basementless house on a wet site.

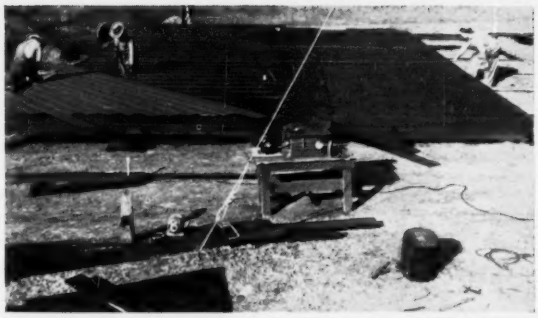

FIG. 4.—Use of pressure treated lumber for subflooring and joists is recommended for crawl-space type houses to permanently protect these components against the hazards of wood deterioration.

ture leaves no doubt that the lumber industry faces an active and expanding demand situation. Steady population growth and expanding industries represent a built-in market. The eventual size of the market will depend to a large degree upon the promotional efforts which are made in the next few years. In estimating future markets the report states:

If past preferences continue, the distribution of future demand for softwood and hardwood lumber may be about as follows:

	Softwood	Hardwood	Total
		Million board feet	
Consumption in 1952	33,408	8,054	41,462
Projections to 1975			
Lower	36,800	10,800	47,600
Medium	42,400	13,100	55,500
Projections to 2000			
Lower	41,100	13,700	54,800
Medium	58,900	20,100	79,000
Upper	67,000	23,000	90,000

It should be noted that the above estimates are based on a continuation of past preference patterns. There is every reason to believe that past performances can be bettered. Reaching the higher estimates by the year 2,000 may now appear a little fantastic, but developments in genetics and timber utilization will increase lumber output immeasurably. The protection of lumber against the dangers of fire, fungus, and insect attack are now a reality. On the horizon we see the rugged individualism that has characterized the lumber industry for generations being directed toward improved marketing techniques, all of which makes the future outlook for lumber most encouraging.

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The Oregon Forest Products Research Center

John B. Grantham
Director,
Oregon Forest Products Research Center,
Corvallis, Oregon

In 1957, the former Oregon Forest Products Laboratory graduated to permanent, expanded quarters as part of a new Oregon Forest Research Center. This facility, located adjacent to the Oregon State College campus, comprises the Forest Products Research Center, the Forest Lands Research Center, formerly quartered at the State Forestry Department in Salem, and administrative offices of the Forest Protection and Conservation Committee which broadly oversees and finances the activities of both research groups.

The new name of Forest Products Research Center emphasizes close association with the Forest Lands Research Center as part of a combined facility. Although the separate research programs are little changed, each group benefits by sharing facilities in the new building. Fittingly, the 40,000 square feet of space provided exemplifies the beauty, economy, and utility of modern wood construction.

Historically, the Forest Products Laboratory began in 1941 with a modest legislative appropriation to improve utilization of residues developed in harvesting and processing timber. This initial program received continuous but limited support for six years, during which time a small staff, aided by college personnel on a part-time basis, worked to expand residue use.

In 1947, enlargement of research in forest products and initiation of research in forest lands was made possible by legislative enactment of a timber harvest tax. This harvest tax of 5 cents a thousand board feet on logs cut in the state provided a seven-fold increase in available funds and led to establishment of the forest products research program in its present form.

Administration

The Forest Protection and Conservation Committee, which administers the research program, is composed of four members of the Oregon State Board of Forestry and one member appointed from the public at large. The Committee employes an administrator to carry out its policies. Programs of forest research in other states are commonly administered through state colleges, but separate administration in Oregon does offer advantages and does not prevent active cooperation with Oregon State College. Close association with the college has been a major factor in past success of the program, and location of the new Center adjacent to the campus is evidence of desire to maintain this desirable relationship.

Direction of the research program is aided by advisory committees representing several industry groups and public agencies. The Forest Products Research Advisory Committee, which meets quarterly to review current and proposed investigations, includes representatives of all segments of industry, as well as representatives of the Pacific Northwest Forest and Range Experiment Station, the School of Forestry, and the State Forestry Department. The Governor is ex-officio member and chairman.

Financial Support

Major financial support of the research program is from a timber harvest tax. Some supplemental support from general state funds is granted in recognition of the program's over-all benefit to Oregon's economy. Funds available annually to the Forest Products Research Center, including moneys contributed for cooperative investigations, amount to about $230,000.

Physical Facilities

The recently expanded facilities for forest products research include ample floor area for all phases

FIG. 1.—Oregon's new forest research facility, adjacent to the Oregon State College campus, provides offices and laboratories for both the Forest Lands and Forest Products Research Center.

of the program. For example, a 30- by 80-foot test area is provided with a grid of floor anchors to permit indoor testing of structural elements such as roof beams, wood diaphragms, and wall sections. Formerly, such tests were of necessity performed out of doors. Based on past experience, the new building was planned carefully to provide additional space in conditioning rooms and in service areas such as the wood shop, machine shop, and stock room, as well as in all laboratories, work areas, and offices.

Research equipment includes a wide complement of machines and instruments for physical and chemical analyses, ranging from universal testing machines to a spectrophotometer. Microscopic, photographic, and pulp testing equipment are among items included. Larger equipment, needed to simulate standard wood processing, includes treating retorts, dry kilns, hot presses, an attrition mill for fiber refining, and auxiliary items such as chipper, hammer mill, mixer, and glue spreader. Specialized equipment to accomplish specific investigations, such as extractors, felting machines, extruders, and the like are fabricated in the Center's machine shop as need arises.

Use is made also of specialized equipment available at the college, or processing equipment available at industrial plants. Many cooperative studies are conducted in large measure at the cooperating firm's plant.

Technical Staff

The technical staff of 18 includes technologists, chemists, and engineers recruited from all parts of the country. This technical staff in products research is assisted by two aides and by part-time student help. Graduate student research is a small but important part of the program. Graduate students, and college staff supervising their work, not only contribute to the program, but, through their investigations, acquire increased interest in forest products utilization.

Scope of Forest Products Research

Research activities are divided broadly into two fields: (1) recovering values from wood or bark residues, and (2) improving serviceability and sale value of all wood products.

Use of residues for purposes other than fuel reached nearly one million tons in Oregon in 1956. Expanded industrial use of the several million tons still available annually could provide increased returns from each acre of timber cut, add payrolls to convert residues to useful products, and help maintain lumber and plywood in a strongly competitive position by sharing the burden of high log costs.

Current research in residue use includes both chemical and physical studies. Chemical investigations are directed primarily to chemicals from Douglas-fir bark, high-yield pulping of Douglas-fir chips, and utilization of spent pulping liquor. Both bark and wood chemistry research is concentrated on Douglas-fir, since this species dominates surplus materials developed at sawmills and veneer plants.

Bark chemistry investigations currently include small pilot-plant production of extractives, notably waxes, tannins, and flavanoids; study of derivatives and components of these major extractives to enhance opportunities for commercial ventures, and basic investigations of bark "lignin."

High-yield pulping studies on Douglas-fir include mechanical and semi-chemical reduction to pulps potentially suitable for such products as corrugating medium and newsprint in an effort to expand the pulp industry's use of such residues. Use of Douglas-fir chips for kraft linerboard is a well established and large-volume market, but does not provide outlet for all residues available.

Physical utilization of residues thus far has been chiefly in hardboard, softboard, and particle board. Present output of Oregon board plants is valued at more than 20 million dollars a year, derived from materials largely unused prior to 1946. Because this industry is now well established, research emphasis has been shifted to specialty products such as floor tile made from planer shavings or bark.

Closely related to research on residue materials is that conducted to stimulate interest in commercial use of western hardwoods and other species not fully utilized.

FIG. 2—General view of area for study of plywood, particle board, hardboard, and other manufactured products at the Oregon Forest Products Research Center.

Past research at the Center has been directed to: (1) lumber and veneer grade recovery from such woods, (2) drying schedules, (3) physical properties determinations, and, (4) economics of manufacture.

Improving Serviceability and Sale Value of Wood Products

The broad area of research on existing products ranges from basic timber mechanics (to permit increased efficiency of use or structural design) to refinements in manufacture that upgrade the primary product.

Current work in timber mechanics includes studies on bolt spacing—the ultimate objective being to supplement work at the U. S. Forest Products Laboratory and to provide basis for improved national design specifications. A study having a related objective is that of developing a method for assigning realistic working stresses to non-stress-graded dimension lumber. This study, too, is related to recent work of the U.S. Laboratory.

For several years the Forest Products Research Center conducted a test program on full-scale roof diaphragms to provide structural engineers and architects with data for improving strength and stiffness of buildings, particularly schools, against lateral forces. During the current year, structural studies included tests of 1/16- and 1/5-scale models of the 360-foot wood roof beams designed for a spacious sports arena at Portland's Expositon-Recreation Center. During this investigation, a new testing technique applied a total load of 52,000 pounds to the 72-foot, 1/5-scale model, by use of less than 1 psi air pressure.

A substantial program in seasoning and treating is conducted to improve serviceability of wood products. A current drying study has demonstrated that two large fans can accelerate air drying of 100,000-board-feet lumber charges, and thereby obtain an appreciable reduction in shipping costs, or a substantial gain in kiln capacity.

Other seasoning studies are aimed at developing kiln schedules: (1) for Douglas-fir and West Coast hemlock dimension in standard kilns, (2) for 3- and 4-inch thick lumber of the same species, and (3) for these and other softwoods by high-temperature drying. In addition, the seasoning section, in cooperation with other agencies, offers a one-week short course to industry each year, at which time the latest developments in drying practices are reported.

Work in wood treating is concerned with evaluation of preservatives and preservative treatments, improved pressure and non-pressure treating of both sawn and round products, and basic studies such as that of improving penetrability of Douglas-fir heartwood. This year a study will be initiated on the long-term effect of fire-retardant treatments on strength and fire characteristics of wood. Another long-term study, conducted in cooperation with the Southern Pacific Company, is that of determining service life of ten species of Oregon woods as crossties. More than 10,000 test ties are now in service in four states, and results will have important bearing on future use of many local woods.

Added refinement on manufacture relates closely to improving product serviceability. Further refinement may have the aim of improving surface characteristics, as is true of many overlaid products, but at the same time may offer the advantages of: (1) achieving heightened product value at the primary manufacturing plant, and (2) reducing cost of application on the job.

Current studies at the Center to add manufacturing refinement include such diverse projects as (1) veneer production from heated and unheated Douglas-fir logs—aimed particularly at improved veneer quality—and (2) bevel siding from common lumber. The latter project involves upgrading common boards by application of veneer and resin-impregnated fiber faces, thus providing a highly refined product of superior serviceability.

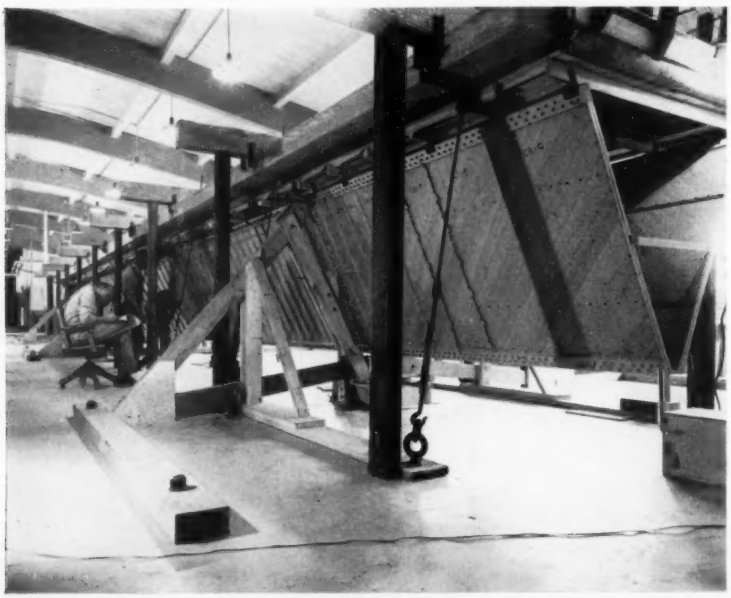

FIG. 3.—Wood scientists in timber mechanics department at the Forest Products Research Center test fifth-scale model of roof beam for Portland, Oregon, Exposition-Recreation Center.

Cooperative Research

Cooperative research with industry or with other research agen-

cies offers many advantages, and the Forest Products Research Center welcomes opportunities to pool research efforts. The policy is to cooperate fully with both public and private organizations, within or outside Oregon, in efforts to develop and make available information that will contribute to improved utilization of the forest resource.

Cooperation has been extensive with federal agencies, divisions of Oregon State College, manufacturer's trade associations, professional organizations, and private industry. Such valued cooperation not only avoids duplication of effort but brings broad experience to bear on a problem, offers opportunity for an early or more complete solution, and gains quickened acceptance or application of results.

SCHOOL BOX SCORE 1958 MEMBERSHIP

	Student Applications Received		
	Aug. 1958	Total 1957	Total 1958
Alabama Polytechnic Institute	0	19	22
University of California	0	30	56
Colorado State University	2	19	15
Duke University	0	13	3
University of Florida	1	6	15
University of Georgia	3	86	42
University of Idaho	1	19	14
Iowa State College	2	35	21
Louisiana Polytechnic Institute	0	18	5
Louisiana State University	1	41	7
University of Maine	0	31	22
University of Massachusetts	0	10	4
Michigan Coll. of Mining & Tech.	1	29	5
Michigan State University	4	24	29
University of Michigan	3	14	17
University of Minnesota	4	28	31
University of Missouri	0	62	7
Montana State University	1	45	17
State University of New York	4	25	16
North Carolina State College	0	36	1
Oregon State College	3	29	30
Pennsylvania State University	2	32	23
Purdue University	0	18	18
Utah State University	0	5	24
University of Washington	2	27	26
W. Virginia University	0	19	19
Yale University	0	7	5
Total	34	727	494

SECTION BOX SCORE 1958 MEMBERSHIP

	Applications received[1]		
	Aug. 1958	Total 1957	Total 1958
Allegheny	3	68	49
Appalachian	3	71	19
Central Rocky Mountain	2	24	15
Central States	0	30	19
Columbia River	5	55	50
Gulf States	4	84	38
Inland Empire	1	21	16
Intermountain	0	6	31
Kentucky-Tennessee	0	8	3
New England	1	62	43
New York	4	37	24
Northern California	0	39	11
Northern Rocky Mountain	1	49	23
Ozark	0	92	18
Puget Sound	2	61	46
Southeastern	5	132	89
Southern California	0	3	0
Southwestern	1	7	1
Upper-Mississippi Valley	7	69	61
Washington	0	10	1
Wisconsin-Michigan	8	84	68
Total	47	1,012	625

[1]Student, Junior, Affiliate, Associate (Initial) grades only.

Developments, Trends, and Problems in Education and Research in Forest Utilization

Raymond J. Hoyle,
Professor emeritus, State University College of Forestry at Syracuse University, Syracuse, New York

In 1900 the first bachelor's degree was conferred by a forestry school in the United States and it was the only forestry degree granted that year. In 1909, 150 bachelor's degrees and 216 master's degrees had been conferred. The peak year was 1950 with 2,321 bachelor's, 275 master's, and 31 doctor's degrees.

In 1957 there were 1,174 bachelor's, 223 master's, and 48 doctor's degrees.[1] In that year there were 115 bachelor's, 32 master's, and 12 doctor's degrees conferred in the combined fields of wood technology and utilization. This constituted 11 percent of forestry college graduates for 1957. When the degrees in pulp and paper, chemistry, light construction, merchandising, and other forest products specialties are added to those of wood technology and utilization, the percentage jumps from 11 to about 19. It is evident that the broad field of forest products today has become an important one.

Forestry schools have always offered one or more courses in logging, sawmilling, and primary forest products as an essential part of a general forestry curriculum and of necessity students have also been grounded to some extent in the physical and mechanical properties of wood and its identification. By 1910 detailed utilization courses began to appear and from that time on a rather rapid expansion of such courses occurred in many schools. The exceptions were usually schools that trained students with a regional slant in regions where utilization problems were not considered important or schools that emphasized a broad general training in forestry.

As economic conditions and the methods of utilization changed it became possible to employ a few specialists to improve the yield of forest products and their derivatives. Rising stumpage and labor costs increased the value of lumber to such an extent that it became profitable for the industry to conduct research in wood utilization. Motion and time studies were made in the woods and at the plants at an early date. It became apparent that there was a need for men with additional education in forest products. A few schools responded to the needs of industry with new courses in utilization. These courses went beyond the scope of logging and milling and were devoted to the further conditioning of the sawed products and their use. Another field of utilization that made an early beginning was merchandising and sales, but the schools in general did not follow this pattern to any appreciable extent. (However, there has been considerable expansion in this field in the last few years.) During all of this time wood identification and wood properties were taught either as one or more courses and they generally were known as wood technology, but they were a part of the forest utilization curriculum.

Prior to about 1940, the term "wood technology" was used by very few schools to describe a curriculum and majors or options in wood technology were not offered except in a very limited way in one or two schools. Some schools even relegated wood identification and timber mechanics to the list of utilization courses. Beginning about 1940 several schools offered options or majors in wood technology. By 1950 several more offered options or majors in the whole products field and more have offered new options nearly every year since then. Some schools have changed the names of their products options several times while others have retained the original names.

Curricula and Names Vary

Schools are approaching various forest products specialty fields

[1] Marckworth, Gordon. Statistics from schools of forestry for 1957: degrees granted and enrollments. Jour. Forestry 56: 129-135. 1958.

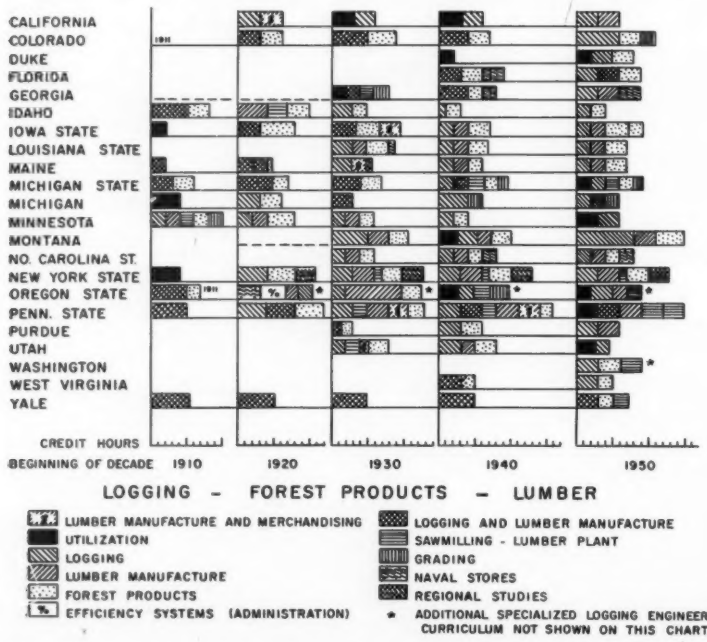

FIG. 1.—Courses and credit hours of logging, forest products, and lumber offered by forestry schools by decades.

differently and under different names. Some schools emphasize engineering, some wood itself, others the business aspects, and some a specific wood product. Most schools, however, are attempting to prepare men for quite similar fields of employment. Today 18 schools have 20 curricula known by 10 different names. Five curricula are called wood utilization; three, forest utilization; three, forest products; three, wood technology; one each, forest products and technology; forest products marketing; wood technology and utilization; forest products industries; wood industry; and wood technology-utilization. There are four additional schools that have more highly specialized curricula than the others. These schools may have curricula in both technology and utilization that in turn may include two or three options or majors known by different names but all dealing with the physical or chemical aspects of forest products. Some institutions have building merchandising curricula or options. This indicates the extent to which a few schools have gone in specialization. The marketing or merchandising options or majors in several schools are quite different because some give considerable emphasis to business and specialized courses while others choose the engineering approach. Products or utilization options in a general forestry curriculum are offered at some institutions but they are not adequate for most areas of industrial manufacturing employment.

Not one of these 10 names of curricula singly or in combination, is a good choice because they do not give a clear idea of the type of training the student receives or what he is fitted to do upon graduation. The writer believes that the best choice of a term would be some kind of engineering and preferably "wood engineering" or "wood products engineering." However, if the term engineering is used, enough basic physical science and engineering subjects must be given. A wood engineering curriculum has been developed and gradually improved by a few schools and others are following this lead.

Pattern of Development

For purposes of showing some developments in this broad field of utilization education, four figures are used from an unpublished manuscript that was prepared in 1952.[2] These four figures were prepared to show the courses offered in four categories of forest utilization education as follows: logging—forest products—lumber; manufacturing and processing methods; distribution and sales; and wood technology. In the case of schools having three terms per college year instead of the usual two terms, the credit hours are multiplied by 2/3 to obtain comparable data. Curricula dealing with logging engineering, pulp and paper, plastics, furniture manufacture, and similar specializations were omitted from the report because they could not be compared on the same basis as general utilization curricula.

As faculty members became more experienced and literature gradually became plentiful some courses offered in 1910 were enlarged and expanded into two or three separate courses by 1920. New ones such as regional studies or more specialized courses in logging were added by a few schools. By 1920 some schools were offering one or more courses in wood preservation, seasoning, kiln drying, uses of wood, and wood pulp and paper products. It was not always possible for the general forestry students to take all of these courses but students who wished to take all of the utilization courses were thus given a slight degree of choice in specialization.

The opportunity to specialize grew as new courses were added and old ones expanded. By 1930 a program of education in wood-using industries was being presented at several schools, the older courses were being expanded and the opportunity for specialization in utilization was clearly increasing in several schools as seen in Figures 1 and 2. The field of distribution and sales shown in Figure 3 did not expand as much as the other fields up until 1950, but since 1950 there has been substantial expansion.

The faculties of forestry schools were originally composed very largely of men whose training had been in the biological sciences and

[2]Hoyle, Robert J., Jr. Unpublished manuscript. State University of New York, College of Forestry, Syracuse, N.Y. 1952.

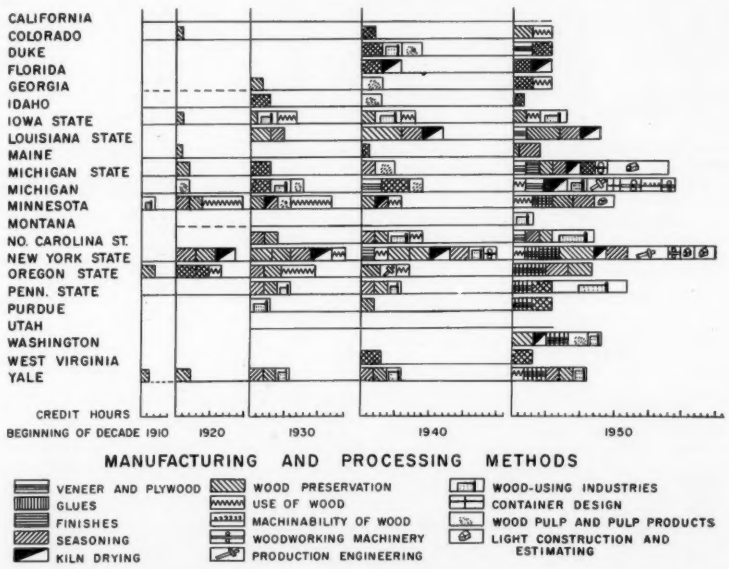

FIG. 2.—Courses and credit hours of manufacturing and processing methods offered by forestry schools by decades.

whose employment had been largely with the federal or state governments. Jobs with industry where a knowledge of the field of utilization was important had not developed to an appreciable extent and graduates had to make their own jobs with industry in most cases. Faculty members not in the field of utilization were usually reluctant to accept new courses, especially so if it meant dropping such courses as botany, geology, silviculture, or management.

At first the selection of these new specialized courses was confined to the senior year, but as more were added, it became apparent that some should be given in the junior year. Today this specialization starts as early as the the freshman year in several schools.

The graduate of a forestry school who had taken the utilization curriculum and who had not pursued the full curriculum of general forestry courses should not be called a forester, said some of the older foresters. Others said that many utilization courses were largely trade school courses and had no place in a college curriculum. The graduates were getting jobs nevertheless and salaries were favorable. Although such remarks did sting for awhile, they did not stop the progress of the schools and the faculty members who were pioneering this newly developing profession of wood engineering, which has proven to be the bottleneck of forest management.

While the training of a general forester and a wood engineer has become more and more distinct, and even though the Society of American Foresters has recently set up standards that prevent specialists in this field from becoming Junior Members of the Society on graduation, the two fields more than ever depend on each other.

"Forest Products—Key to Forest Management" is the title of a paper by U.S. Forest Service chief in 1957. This paper, as do others noted in recent years, illustrates how important it is that forestry schools have seen fit to put in these specialized lines of training.

To the best of the writer's memory, the term "wood engineering" was not used before about 1930. Thomas D. Perry, a graduate engineer from Massachusetts Institute of Technology who had worked for many years in the wood industry, may have been the first to suggest this type of training. He tried to get his Alma Mater to put in such a curriculum, but with no success. Engineering schools that have been approached on this subject have turned a cold shoulder to it. In 1930 the writer presented a paper before the Wood Industries Division of the ASME in New York City, entitled, "Need of Forest Products Engineers in the Woodworking Industries." At this meeting a curriculum in wood engineering was also presented and discussed. This was followed by much favorable comment and discussion and in the following weeks several trade journals had favorable editorials on the topic. Wood engineering has not developed as fast as some had anticipated, but it will only be a matter of time before it will be fully recognized among the professions.

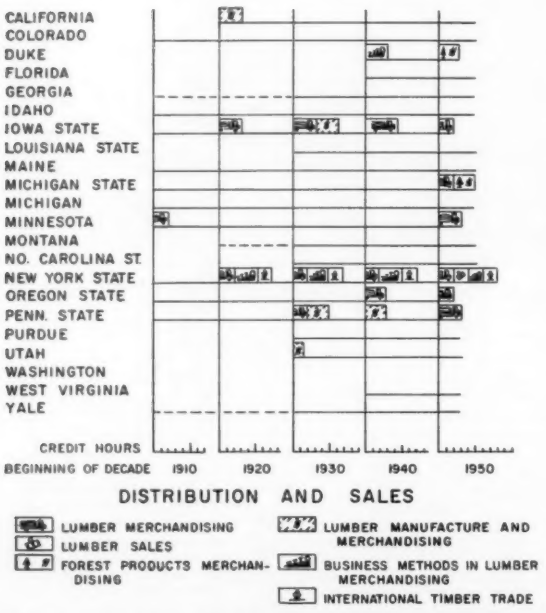

FIG. 3—Courses and credit hours of distribution and sales offered by forestry schools by decades.

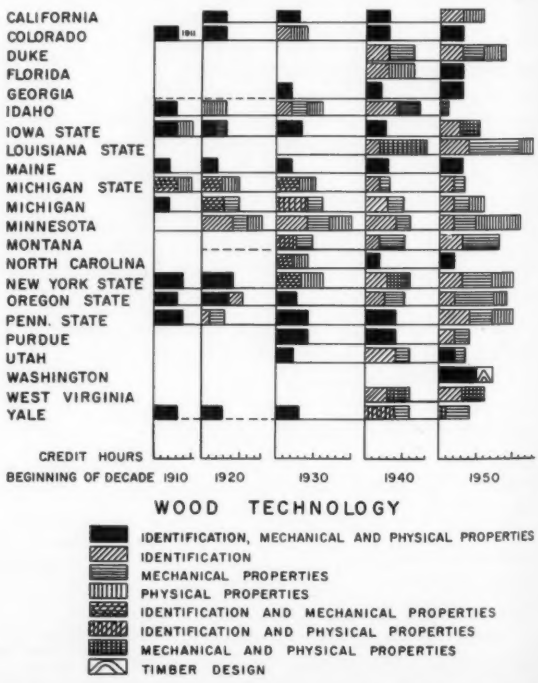

FIG. 4.—Courses and credit hours of wood technology offered by forestry schools by decades.

Following the end of World War II in 1945, the young men returned home eager for education. They had seen many things of an engineering nature and were interested. The small supply of manufactured products of all kinds was in big demand and manufacturers were calling for young technically trained men. Even the tradition-bound wood using firms became more alert to their needs for young men who could qualify as wood engineers. No such specific degree has ever been conferred in this country by an engineering school or a forestry school, but there are several forestry schools that have developed curricula that prepare men to do wood engineering.

Figure 2 shows the rather rapid progress that has been made between 1940 and 1950 by the schools in adding specialized, applied courses dealing with preparation, conditioning, and use of the raw material. While the schools have been developing these new courses, they have also added more mathematics, physics, chemistry, statistics, electrical engineering, and other basic engineering courses such as industrial engineering, and courses classed as wood technology (Fig. 4). In fact, today a few schools are giving some of their wood products specialists as much or more basic science as a mechanical engineer receives. Not only do students receive training in the physical sciences but also some of the biological sciences.

Training Today

A questionnaire sent to all of the forestry schools, including Canada, in April 1958, brings up to date the advancements which the schools have made in educating wood engineers for industry. With the proper selection of elective courses on top of the required courses, a graduate can enter the woodworking and closely allied industries with a better background of training than that given by engineering schools.

The field of utilization today has reached the point where it deserves a name that is recognized and understood in the trade. Engineering college faculties have few members who understand wood and they have made no move to prepare men for the field of wood engineering. Forestry schools have moved in this direction at an increasing pace. Several have reached the point that they should be conferring a degree in wood engineering. Graduates are becoming known as such in the trade. Why not give a degree that will aid them in describing their type of training and also help the prospective employer understand what they are prepared to do? Another important reason for using the term "wood engineering" is that it will be more appealing to prospective students who are inclined to follow some branch of engineering. There is a need for high grade students interested in wood and engineering.

Because of local conditions and demand for graduates with different types of training, there will probably always be a rather wide difference between the forestry schools, particularly in the elective courses offered in the broad field of forest products. Some schools may wish to prepare all men for general forestry. Other schools will prepare some students for general forestry and some for the products field. There will also be schools that will offer a rather wide and diversified line of training in products. Some of these latter schools are stressing more and more the physical sciences, applied courses in the wood industry, and engineering training and in the near future some of them are likely to be offering a degree in wood engineering.

There is a definite trend for many schools to emphasize more than ever the physical sciences as well as engineering, wood technology, and utilization courses. Within the last five years several schools have moved in this direction. They have also completed new products laboratories or have such plans for the next year or two. Today 13 schools are emphasizing this type of work. They require from 6 to 14 credit hours with an average of 10 hours of mathematics, 6 to 14 of chemistry with an average of 11 hours, 4 to 10 of physics with an average of 8 hours, and several schools require one or two additional courses in statistics.

These schools require 3 to 14 hours of wood technology with an average of 9 hours and 9 to 29 hours of wood utilization with an average of 16 hours. One or several courses in industrial engineering and other courses in wood technology and utilization are often taken as part of electives in the various options. In order to find a place for these important new courses, the credit hours in botany, mensuration, surveying, silviculture, management, entomology, zoology, and some other courses taken by general forestry students, have been reduced or even eliminated

There is difference of opinion between schools about how far specialization should be carried in undergraduate work. The student today has a wide choice of curricula among the forestry schools to suit his needs and desires. Schools that are stressing the products field offer 30 credit hours of elective courses on the average. On a two-semester basis this is nearly two full semesters of work. With good counseling at the sophomore and junior levels, a student may choose a program of study that will give him excellent preparation for these newly developing fields of specialization. One or two years of graduate work today is very much worth while because so many good courses have to be omitted in a 4-year program. If a student is going to do graduate work he should make his decision as early as possible in order to take the proper sequence of basic courses.

Today the schools that are stressing products are requiring an average of 12 credit hours of English (written and spoken). It is generally agreed that students are deficient in this subject but it is believed that the teacher of technical subjects should take more time to correct reports and examinations for errors in English. A firm attitude with respect to composition and grammar would emphasize the importance of this phase of the student's education. It should be mentioned that the teacher has a

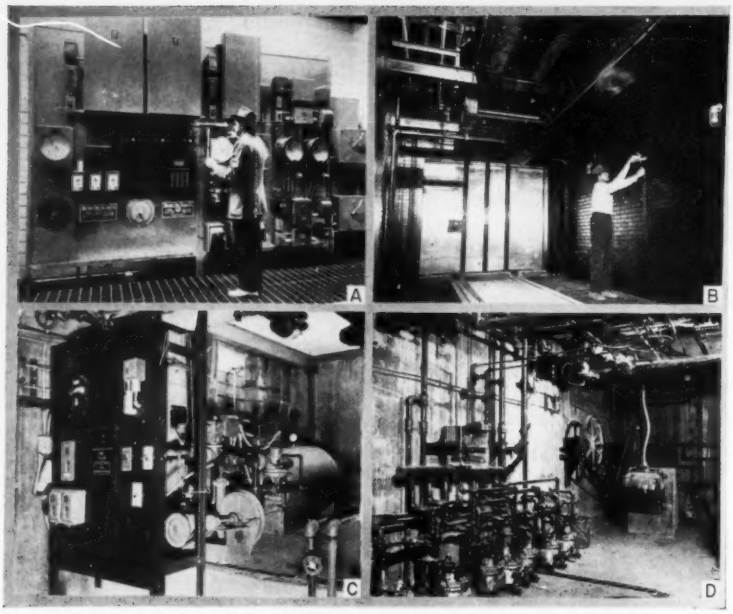

FIG. 5.—Dry kilns and equipment for research and training. (*A*) Control panel with recording controller, potentiometer, Kil-Mo-Trol, steam flow meter measuring device, variable speed fan, regulators, and components. (*B*) Internal view of largest of 5 kilns. (*C*) Control panel and the gas-or-oil fired dry kiln heating unit. (*D*) Dry kiln pit showing internal fan system, the steam-trapping system and the steam flow meter equipment. Hugh P. Baker Laboratory, Syracuse, N.Y.

full-time schedule and lack of time is the reason why many things are not done. Most teachers in forestry schools are overloaded with counseling, administrative, and teaching work. They should not be required to teach more than two courses per semester.

Social sciences are courses that appear to have been crowded out of all forestry curricula and everyone seems to regret it, but when an adequate technical background is necessary, no one seems willing to reduce the technical for the social. A partial answer to this need for a broader background of education would be more rigid requirements for college entrance which would force the high schools to a higher level of teaching.

Industry Needs

What does industry need in the way of trained men? The schools that are training men for industry are quite well agreed in their answers to this question. These may be summarized as follows: good basic training, a good knowledge of wood, professional courses in wood manufacturing processes, scientific and social background, a good technical background, a research training, manufacturing and administrative training, basic physical sciences, knowledge of humanities, business courses, ability to communicate, and training to think. Of course this is very well but how much can be given in four years, and which is the most important?

Men with undergraduate degrees in wood products have been entering the wood industry for over 40 years and in the last 10 years many have done so. The training of these men from the various schools has been quite different although at first they had very little, if any, specialized training. Most all of these men, however, have made good. This seems to prove that they all received a fairly satisfactory technical training for the jobs at that time. The reasons for their success in areas beyond their training has been their personality, good understanding of human relations, and a willingness to work hard and continue to study and learn on the job. Faculties quibble and argue whether this or that course should be given when perhaps the quality of the present teaching and the needs of the student in social sciences, human relations, and communications are being neglected.

As time passes and the profession of forest products, technology, utilization, wood engineering or whatever it may eventually be called, becomes older and gradually outgrows its youthful pains there will probably emerge a few rather standard curricula, as we have today in the many branches of engineering. Until our profession is older, we shall continue to find wide differences in courses and credit hours for courses between the schools. The demands by industry will be one reason for this development, but the wood industry must meet the salary and additional benefits offered by other industries today because talent will go and is going to the highest bidder.

Experience clearly shows the wood industries in most cases do not want men too highly trained in basic sciences and especially if the applied courses have not been well covered. A very high percentage of the prospective employers of forest products graduates are relatively small industries and they do not have the organization or the type of work for a highly specialized scientist. The wood industry needs men with a broad base who can carry on applied work. Twenty or more years from now the wood industry will need more men with the highly specialized scientific training. Some college teachers in their anxiety to turn out high grade scientists to delve into the problems of the wood industry, and especially the unknown things about wood, tend to loose sight of the current demand for their graduates. Most students do not take graduate work and schools should develop undergraduate curricula that will be of the most value to the students and the wood industry. The present trend indicates that the applied and engineering approach with sufficient

physical science is the best training for such work.

Applied Subjects Needed

Courses that have laboratory periods of an applied nature are sometimes called trade school courses or bread and butter courses and as such, it is said, have no place in a college curriculum. Whether or not a course is at the trade school level depends on what is taught and how it is taught. If principles and fundamentals are stressed, and knowledge of the sciences and engineering are basic to an understanding of the course, it certainly is not at the trade school level. The use of laboratory equipment is often the best way to illustrate and understand principles. A good laboratory period puts life and interest into a course. A laboratory period in a sawmill, dry kiln, wood working room, or a timber testing room is just as fundamental as an engineering machine shop course, a materials testing laboratory, a strip cruise in a woodlot, or an afternoon with a transit. Laboratory courses have been vastly improved in many schools in recent years. Students who have not had laboratory courses in these applied subjects generally find it desirable to take them before they can go on for graduate work in their respective fields. With several new school laboratories recently completed and others in the building and planning stages it is clear that these courses are on the increase and like any course when taught at the proper level is of sound college caliber.

Research Work at Schools

Every school wants to see its staff produce some research and also contribute to the literature. It is only recently that any full time research workers have appeared on the forestry school faculties or research staffs. Research that has been done by teachers has indeed been very limited, chiefly because the teachers do not have sufficient time. This is also the reason that many teachers have written very little. When research or publication is undertaken it is often done on the man's own time or at the sacrifice of good teaching. The customary way in which research work is being done is by graduate students under faculty direction. By good organization it is possible to have several students work on segments of a problem over a period of years. These parts when put together give results that form a substantial contribution. Most kinds of research done by faculty should be on a basis that permits concentration upon the work for a few months at least, or half days every day for several months. Research that must be picked up and then laid aside, worked on whenever time is available, is almost useless. This is also true of writing articles of any consequence. Unfortunately however, this is the way most teaching faculty must operate if they are able to do anything in their fields. Research is on the increase because there are more graduate students and because money is being made available by the schools and industry.

Whenever possible, teachers and research workers should do some consulting work for industry. Consulting work gives the school man an insight into the problems of industry that cannot otherwise be obtained and it brings clearly into focus the needs of industry for both basic and applied research. This industry contact may result in good research problems that are given to graduate students or even financial aid from industry for graduate students or faculty doing graduate work. Consulting work may often be the bridge between the school and industry on the road to research. It will also help the school man to be a better teacher. Too few teachers have had industry experience or contact.

Short Courses

Practically all schools emphasizing products offer one or several short courses per year and some also hold one or more conferences for industry. These require much faculty time no matter how they are organized, but like consulting work are good for the faculty and the school as they bring the teacher close to the problems of industry.

Conclusion

The forestry schools have gone a long way since the first degree was granted in 1900. Almost from the very first, the harvesting of the trees was considered as a subject of some importance. A little later the curricula developed a step further than growing, managing, and harvesting and included the processing of the logs and rough forest products. It later came to include remanufacturing, conditioning, use, and marketing. Graduates infiltrated all branches of the wood processing industries, and the demand for more of these men gradually increased. At first and for a long time, the curricula that offered special courses for industry were known as forest utilization or wood utilization curricula but in more recent years a wide variety of names have come into use to describe them. Eventually there will be a stabilizing or consolidating of many of these terms and the core subjects of curricula will probably be quite uniform between the many schools offering such training. The present trend in choice of a name to decribe this training is toward the term "wood engineering."

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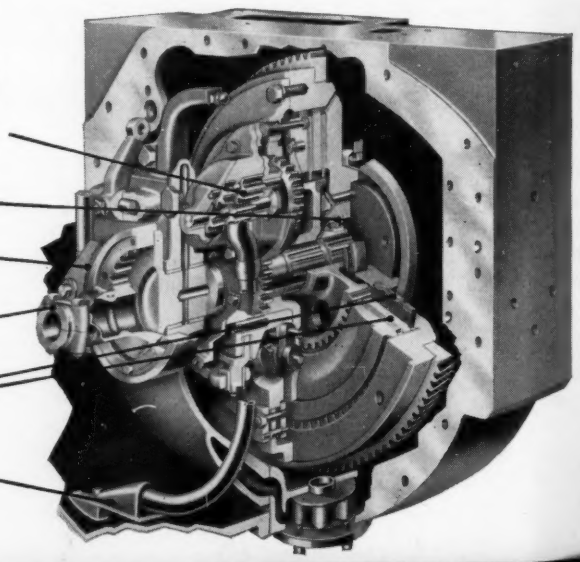
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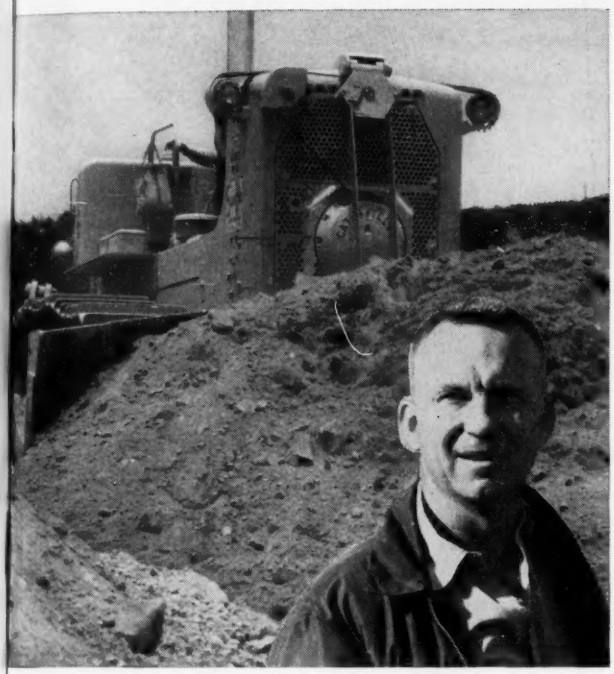

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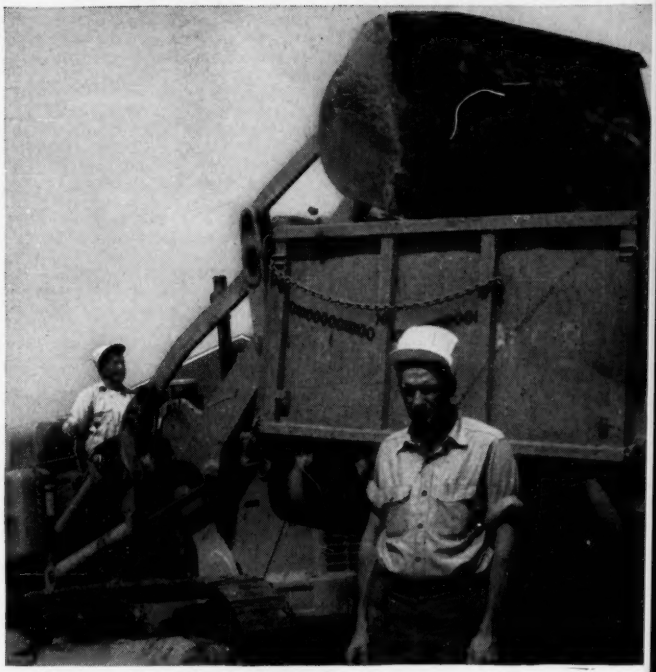

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LEADER IN EARTHMOVING RESEARCH

Society of American Foresters
Check List of Forestry Items in a Working Library[1]
1958

Compiled by MARY LIDA EAKIN, *Librarian, Forestry Library, in Consultation with the Staff, School of Forestry, University of California*

Books[2]

General Interest
Category[3]

Author and Title

2 L'Association des Ingenieurs Forestiers de la Province de Quebec. Vocabularie forestier. Quebec, edition "La Forestiere," 1946.
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2 The conservation yearbook, 1955-56. Wash., D.C., Cornwell, Inc., 1956.
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3 DeVries, L. German-English science dictionary. 2nd ed. N.Y., McGraw, 1946.
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1 Forestry abstracts. Farnham Royal, England, Commonwealth Agricultural Bureaux. v.1 to date.
3 Forestry directory, 1949. Wash., D.C., American Tree Assoc., 1949.
2 Handbook and directory of the forest industries. Seattle, Wash., Lumberman-Timberman. latest ed. (yearly).
2 Handbook of chemistry and physics. Cleveland, O., Chemical Rubber Co. latest ed.
2 Herbage abstracts. Farnham Royal, England, Commonwealth Agricultural Bureaux. v.1 to date.
3 Institute of Paper Chemistry. Library bulletin. Library notes. v.1 to date. Appleton, Wis.
2 Metsänanakirja: Finnish - Swedish - German - English forest dictionary. Helsinki, Kustannusosakeyhtiö Otava, 1944.
2 National Lumber Manufacturers Assoc. Forest products research guide. 6th ed. Wash., D.C., National Lumber Manufacturers Assoc., 1956.
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2 Raber, O. German-English dictionary for foresters. Wash., D.C., U.S. Forest Service, 1939.
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3 Trelease, S. F. The scientific paper; how to prepare it, how to write it. 2d ed. Baltimore, Williams and Wilkins, 1951.
2 U. S. Bureau of Census. Statistical abstract of the United States. Wash., D.C., U.S. Govt. Print. Off. latest ed. (yearly).
2 U. S. Dept. of Agriculture. Agricultural statistics. Wash., D.C., U.S. Govt. Print. Off. latest ed. (yearly)
1 U. S. Dept. of Agriculture. Yearbooks of agriculture (since 1935). Wash., D.C., U.S. Govt. Print. Off.
3 U.S. National Archives. United States government organization manual. Wash., D.C., U.S. Govt. Print. Off. latest ed.
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2 Winchell, C. M. Guide to reference books. 7th ed. Chicago, American Library Assoc., 1951. . . . Supplement, 1950-1952. Chicago, American Library Assoc., 1954.
3 Wood working digest directory. Wheaton, Ill., Hitchcock Pub. Co. latest ed. (biennial).
2 World almanac. N. Y., New York World-Telegram. latest ed. (yearly).

Forestry

2 Allen, S. W. Conserving natural resources. N.Y., McGraw, 1955.
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2 McKinley, C. Uncle Sam in the Pacific Northwest; federal management of natural resources in the Columbia river valley. Berkeley, Univ. of Calif. Press, 1952.
2 Ordway, S. H. Resources and the American dream, including a theory of the limit of growth. N.Y., Ronald, 1953.
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[1]This list revises and brings up to date one originally compiled in 1950 at the suggestion of the Council of Forestry School Executives.

[2]Availability of listed books from the indicated publisher is not necessarily implied from the inclusion of the title in this list.

[3]A rating of the desirability of inclusion of the book, number one being in the category of most desirable.

3 Patterson, A. E. A syllabus on professional ethics as they relate to the profession of forestry. Wash., D.C., Society of American Foresters. 1949.
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City Forestry

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  Oregon Forest Products Research Center
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Forest departments of the several states
Forest Product Laboratories of Canada
Forestry foundations
Forestry schools
National Lumber Manufacturers Association
Regional trade associations, e.g.:
  Southern Pine Association
  West Coast Lumbermen's Association
  Western Pine Association
Society of American Foresters
State agricultural experiment stations
State university agricultural extension services
Tennessee Valley Authority
United Nations, particularly:
  Food and Agricultural Organizations of the United Nations
U.S. Bureau of Census
U.S. Department of Agriculture
U.S. Department of Commerce
U.S. Department of the Interior
U.S. Forest Service, including:
  Forest experiment stations
  Forest Products Laboratory, Madison
  Forest regions
U.S. National Park Service
U.S. Soil Conservation Service

Professional and Scientific Journals

American Journal of Botany
American Midland Naturalist
Auk
Botanical Gazette
Botanical Review
Ecology
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Economic Botany
Empire Forestry Review
Forest Products Journal
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Forestry (British)
Forestry Chronicle
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Journal of the Arnold Arboretum
Journal of Ecology (British)
Journal of Economic Entomology
Journal of Forestry
Journal of Mammalogy
Journal of Range Mangement
Journal of the British Grassland Society
Journal of Wildlife Management
Photogrammetric Engineering
Phytopathology
Plant Physiology
Proceedings of the American Wood Preservers' Association
Proceedings of the Forest Products Research Society
Proceedings of the Society of American Foresters
Proceedings of the Soil Science Society of America
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Revue Forestière Française
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Soil Science
Tropical Woods
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Trade Journals

American Lumberman
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New York Lumber Trade Journal
Paper Industry
Paper Trade Journal
Pulp and Paper
Pulp and Paper Magazine of Canada
Southern Lumberman
Southern Pulp and Paper Manufacturer
Survey of Current Business
Tappi
Timber of Canada
Timber Technology (British)
Timber Topics
Timberman
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Wood (British)
Wood and Wood Products
Wood Preserving News
Wooden Barrel

Magazines

American Forests
American Scientist
Farm Journal
Field and Stream
Forest and Outdoors
Nature Magazine
Regional magazines related to forestry
Trees

Notes

A One-Piece Cylindrical Screen for Protecting Seedlings

The use of wire screens for protecting seedlings or direct seedings against mice, birds, rabbits, or deer is an accepted practice among forest research workers. Generally these protective screens are conical in shape. Though they do offer ease in handling and storing, conical screens still have three main disadvantages: (1) early restriction of seedling crown development; (2) difficulty of construction, particularly in cutting hardware cloth to the proper shape for a cone; and (3) prevention of seedling examination or measurement unless screen is removed (and screen may be difficult to remove if it becomes stuck or frozen in the ground).

A cylindrical screen that overcomes these difficulties has been described by Stoeckeler and Scholz.[1] This screen is made from hardware cloth rolled into a cylinder and fastened by bending over the projecting wire ends. A separate cover is made from a square of hardware cloth fastened down with hooked wire pegs thrust into the soil.

A variation of this type of cylindrical screen has been devised for use in hardwood planting studies being made in Vermont by the Northeastern Forest Experiment Station. This is a one-piece screen that is easily made, requires little cutting, can be fastened rapidly, and is easily disassembled for storage. It has all the advantages of a cylindrical protector, and it can easily be opened for examining seedlings.

This protector is made from a rectangular sheet of hardware cloth 18 inches wide and 36 inches long (size may be varied as desired). The sheet is rolled into a cylinder 18 inches tall and about 11 inches in diameter. This is held together by weaving a piece of soft wire along the overlapping edges of the joint. Three complete "stitches" are sufficient for a secure joint. The wire is drawn tight and then fastened at each end with a couple of turns.

The cover is formed by making four equally-spaced cuts downward from the top of the cylinder. These cuts, each about 5 inches long, produce four flaps that are easily bent in at right angles to form a cover. In the process, the top of the cylinder becomes roughly square in shape.

The finished protector is 13 inches in diameter at the bottom, and 9 inches square at top. Possible disadvantages are the awkward shape (circular at bottom and square at top), and that the cover flaps may break off after repeated opening or disassembly.

The author found it possible with practice to make 12 of these screens per hour when using a 36-inch wide roll of hardware cloth cut down the middle to form 18-inch strips.

With this type of screen, a seedling protected under it can be examined or measured by bending up two or more of the cover flaps. For tall seedlings, the cover flaps may be bent up, forming an open-topped protector to keep out rabbits, and possibly mice.

These protectors are disassembled by bending up all four cover flaps, pulling out the wire stitching, and unrolling the screen into a flat sheet.

WILLIAM B. LEAK
White Pine-Hardwood Research Center, Northeastern Forest Experiment Station, Forest Service, U. S. Department of Agriculture
Laconia, N. H.

[1] Stoeckeler, J. H., and H. F. Scholz. A cylindrical screen for protecting direct seedings of forest tree species. Jour. Forestry 54: 183-184. 1956.

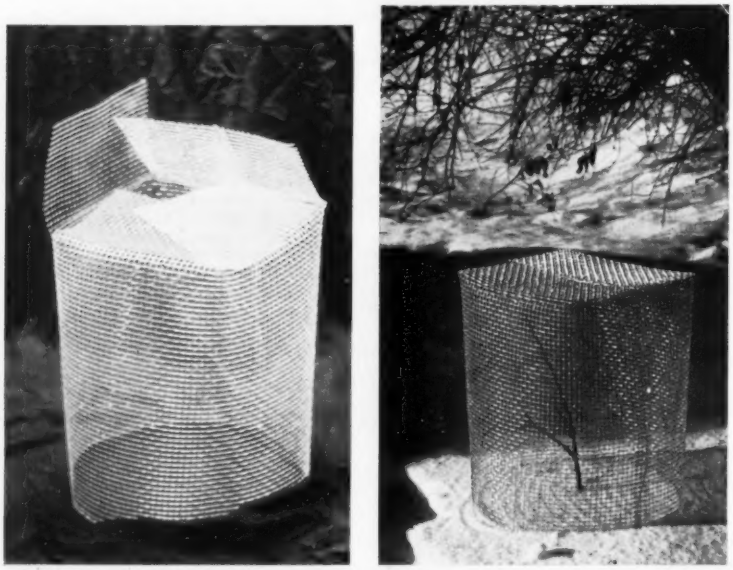

FIG 1. — The one-piece screen seedling protector. Left, the screen in construction, showing how four cuts in the hardware cloth produce flaps that can be folded in to form a cover. Right, the screen in use.

An Aid for Comparing Variable Plot Radius With Fixed Plot Radius Cruise Designs

Bitterlich's method of cruising by means of plots with variable radii is gaining wider recognition by American foresters. However, the relationships between this new method and our conventional methods are not always clearly understood. The accompanying diagram is presented as an aid to visualizing some of these relationships more easily.

Forest inventory practice has long used the concept of fitting plot size to the size of the trees being sampled. Spurr[1] states that concentric plots corresponding to as many as four or five d.b.h. groups are theoretically desirable. However, for practical reasons, the number of concentric plot sizes is usually held to two or three. Two examples of such cruise designs are shown by the dashed lines in Figure 1. One is from a growth study described by Casamajor[2] made for the Shasta Forests Company. The other is the design set up for the forest survey, inventory phase, of the former Northern Rocky Mountain Forest and Range Experiment Station.[3] The axes are logarithmic scales of tree diameter in inches and plot area in acres. The diagram shows the plot size on which trees of a particular diameter class are tallied. The vertical steps made by the dashed lines occur at the minimum diameter for a particular sized plot in these cruise designs.

The diagonal straight lines represent the plot areas corresponding to the diameter of the trees that are counted when using Bitterlich's method. Each line indicates the design for a particular basal area factor. These lines show the ultimate if we were to carry the old process of adjusting plot size to tree size to an infinite degree with the criteria that trees be sampled on plot sizes proportional to their basal areas. The individual steps of the conventional cruise design become narrower and shorter as the number of concentric plots is increased until they become the single straight line of the Bitterlich cruise design. Thus, the new method enables foresters to meet a heretofore desirable but altogether impractical objective in a very simple manner. This theoretical advantage may equal in importance the recognized saving in field work.

The diagram also has use in comparing the standard errors to be expected from cruises made with the two methods. For equal numbers of plots in a given stand, larger plots will have, on a per acre basis, a smaller standard error of the mean than small plots. Therefore, for a plot of a given diameter, if the line for the Bitterlich cruise lies below the line representing the fixed radius plot cruise design, the former can be expected to have a larger standard error than the latter. Conversely, if at that diameter the Bitterlich cruise has a larger plot size than the conventional plot to be used, the former can be expected to have a smaller standard error. Relating the standard error of the per acre values obtained to their respective plot sizes will facilitate evaluating tests comparing the two methods.

A. R. STAGE
Forester (Silviculture), Intermountain Forest and Range Expt. Sta., Inland Empire Research Center, Forest Service, U. S. Dept. Agric., Spokane, Wash.

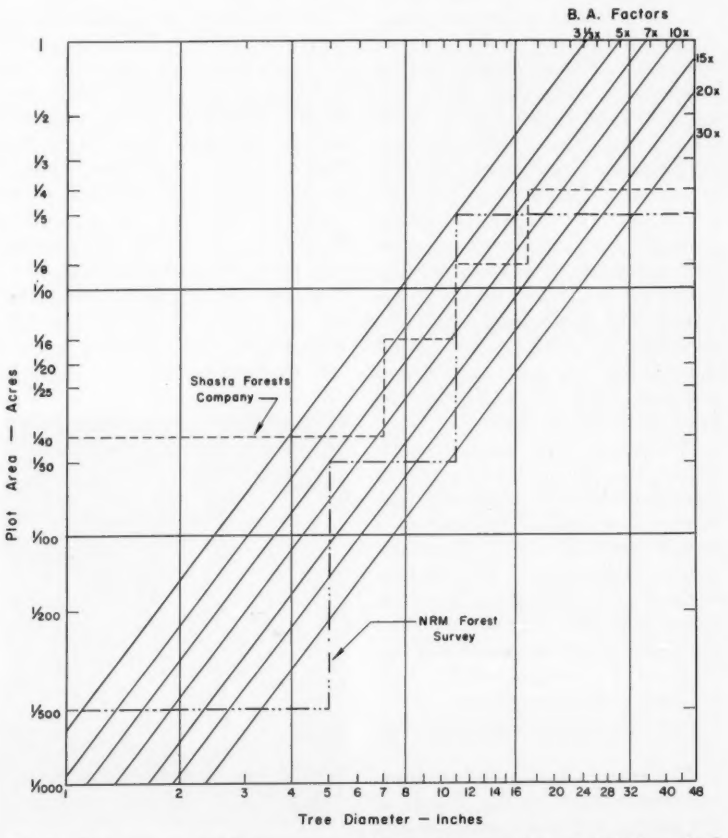

FIG. 1.—Plot area on which trees of a particular diameter class are tallied on fixed-radius plots and plots within variable radii.

[1]Spurr, S. H. Forest inventory. Ronald Press Co. 1952.

[2]Casamajor, P. A forest growth study. Soc. Amer. Foresters Proc., Portland, Ore. Pp. 154-157. 1955.

[3]U. S. Forest Service. Field instructions, forest survey, initial inventory. Div. Forest Economics, Northern Rocky Mountain Forest and Range Expt. Sta. 1951.

Template for Assisting Photo Interpretation

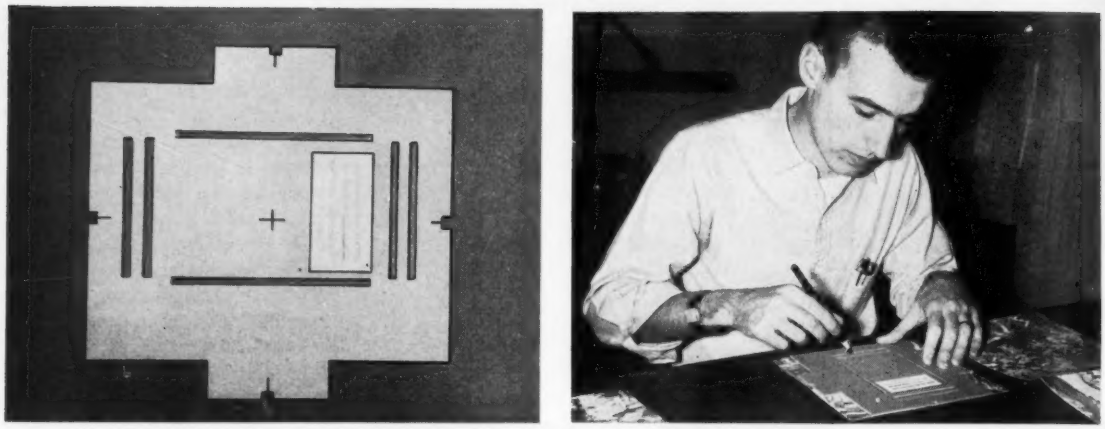

FIG. 1. *Left.*—Template for locating lines for interpretation. The template is laid on a photograph so that the etched lines on the four sides coincide with the fiducial marks of the photograph. A grease pencil is then used on the appropriate slots to outline the area to be interpreted. *Right.*—Template in use.

When confronted with the task of preparing air photographs for a forest inventory or other problems involving photointerpretation, a student is usually at a disadvantage. From lectures he has learned the definition of a neat model, and he knows that the model will vary with different percentages of fore-and-aft lap. He experiences difficulty in keeping his timber type boundaries within a certain area on the photograph, and unless he has some sort of guide, he may have gaps in his typing. The question he would like answered is: "Where do I start the typing on each photograph and how much of the photograph am I expected to type?"

This article describes a template which was designed to answer these questions. A student's confidence is raised if he can see a definite area on each photograph within which he is to interpret various forest conditions. The template (Fig. 1) is made of clear plastic or heavy cardboard and was designed for a standard fore-and-aft lap of 60 percent and a side lap of either 25 percent or 40 percent.

The area to be typed is off-center with respect to the Y-axis of the photograph to accommdate flipping one photograph of the stereo pair; this allows the interpreter to put type lines beyond the limit imposed by a lens stereoscope.

In operation by a right-handed interpreter, the template is placed on the photograph that is at the right-hand end of the flight line so that the marked area is off-center to the left. Type lines are drawn on the right-hand photograph of the stereo pair and, when necessary, the left photograph is flipped up (Fig. 2) and typing can be extended to the left.

When the typing is completed on the area outlined on the first photograph, it is put aside and the left photograph becomes the next photograph in the succeeding stereo pair. In this way, each photograph is typed in order and the right hand is free for drawing the type lines and stand symbols.

FIG. 2.—Left photograph flipped up for extension of typing to the left.

The procedure described above would be most awkward for a left-handed man. This difficulty is met by reversing the template so that the marked area is off-center to the right. Forest type lines and other information are drawn on the left photograph of each stereo pair, starting with the photograph at the extreme left of the flight line.

It sometimes happens that the fore-and-aft lap is less than 60 percent. If this occurs, the type lines on successive photographs will not meet and the size of the gap will depend on the difference in overlap from the standard 60 percent. This problem may be resolved by extending the type lines a short distance beyond the left hand side of the marked area.

Such a method of outlining the area on each photograph to be typed has been successfully tested with the forest photogrammetry students in the School of Forestry at the University of Missouri.

A. J. NASH

Assistant professor of forestry, School of Forestry, University of Missouri, Columbia

The Effect of Rough Handling of Loblolly Pine Cones on Seed Germination

It is known that a relatively light impact on the seed can kill the embryo of some species of southern pine[1], but the effects of rough cone handling on seed germination are unkown. An investigation was undertaken at the Alabama Experiment Station to determine if any impacts that pine cones are likely to receive during collection and subsequent treatment would adversely affect germination of the seed contained in the cones.

Ripe loblolly pine (*Pinus taeda* L.) cones were collected from three trees during November 1957. Sufficient cones were collected from one of the trees to be divided into three groups of 30 cones. There were only enough cones from each of the other two trees for one group. Each of the five groups was divided in two equal parts. One part was used as a control; the other part was subjected to severe impacts.

Impacts were applied by swinging the unopened cones in partially filled burlap bags a minimum of 20 times against a concrete floor. These impacts were considered greater than any that cones would likely receive during ordinary collection and treatment. Cones used as the control were handled as gently as possible.

[1]Darby, S. P. Georgia's new dewinger. Jour. Forestry 54: 579-581. 1956.

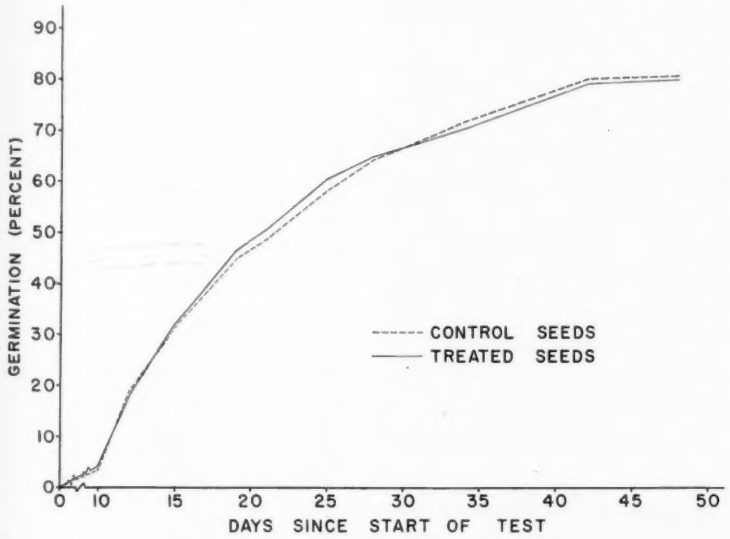

FIG. 1.—Cumulative germination of control seeds and treated seeds.

TABLE 1.—GERMINATION PERCENT OF LOBLOLLY PINE SEED

Mother tree	Treatment	
	Cones gently handled	Cones roughly handled
	Percent	*Percent*
1	57	55
2	93	97
3	90	88
3	86	84
3	76	81
Average	80	81

All cones were air dried, and seeds were extracted and dewinged by hand. Four rows of 50 seed each from the control and treated groups were randomly planted in germinating dishes containing vermiculite. This resulted in a planting of 400 seed from each of the 5 major samples.

Germination counts were begun 10 days after the seed were placed in germinating dishes and repeated at varying intervals during the next 38 days. Eighty-one percent of the seed had germinated by the end of this period, and germination had practically ceased.

The pattern of germination is shown in Figure 1 and the percentage of germination by treatment and by group in Table 1. There was no apparent difference in percentage or rate of germination between the controls and the treated seed. However, there was a significant difference in the rate and percentage of germination between seed groups from different trees.

No direct evidence was found to explain why this rough treatment did not affect seed germination. The obvious theoretical explanation is that the seed were protected by the unopened cones, which absorbed most of the shock of impact.

Although the experiment was not extensive, the authors are confident in the validity of the following conclusions. Presently recommended methods[2] of handling loblolly pine cones are not harmful insofar as seed germination is concerned. Any impact short of crushing unopened loblolly pine cones will not affect the rate or percentage of germination of seed contained in the cones.

E. S. LYLE and
A. R. GILMORE
A.P.I. Agri. Exp. Sta.
Auburn, Ala.

[2]Wakeley, Philip C. Planting the southern pines. U.S. Dept. Agriculture Monog. 18, 223 pp., illus. 1954.

Points of View

Further Comments on Lumber Price Trends

"The Trend in Lumber Prices" in the March issue[1] is the type of article that stimulates both thought and questions. Mr. Zaremba has made a good case for cost as a primary factor influencing lumber price.

Aren't there some other factors, however, that also have a bearing on this matter? In the first place, how about demand? The post-war housing boom that slowed only two years ago created a demand for lumber that certainly must have had some effect on lumber price.

Then, there is the subsidy. The F.H.A. and V.A. housing programs were and are direct subsidies to a substantial proportion (55 percent in 1955) of the housing and thus the lumber industry. This subsidy, while not mentioned in the article must have some influence on lumber price.

I would like also to raise some questions about Mr. Zaremba's basic assumptions. One factor he brushed aside was the significance of stumpage on the cost side. In the 1957 report of the Pacific Northwest Forest and Range Experiment Station, it was pointed out that Douglas-fir stumpage prices for federal timber in western Washington and Oregon increased from $5.20 in 1944 to $28.90 in 1955. Douglas-fir lumber prices F.O.B. mill increased from $22.20 in 1940 to $80.90 in 1955. Thus, the rate of increase was greater for stumpage than for lumber. It is hard to accept that this wasn't significant in forcing prices up. Labor costs were undoubtedly more important, but stumpage is a factor that cannot be ignored.

I would agree wholeheartedly with Fabricant's conclusions about lumber productivity for the period he studied, but I find it difficult to accept the conclusion that labor productivity has not increased significantly since 1939. The almost universal adoption of the band saw is really a post-war development. The riderless carriage, the use of electricity rather than steam, the adoption of individually powered units, rather than power from a steam-driven jack shaft, improved lumber handling systems and machines have all contributed to significant increases in lumber production per man, per mill, per shift, or productivity by any yardstick you might use. We are getting more lumber and better lumber out of the log in the 1958 mill than was possible to have gotten from the same log in a 1939 mill.

These remarks are one "dirt forester's" view of the article. I would appreciate hearing from Mr. Zaremba or any others who read and enjoyed the article as I did.

FRANK A. TERBUSH
Roseburg, Ore.

[1]Zaremba, Joseph. The trend in lumber prices. Jour. Forestry 56: 179-181. 1958.

In Reply

It is important to distinguish between changes in lumber prices in the short run, as in the periods 1915 to 1920 and 1940 to 1950, and changes in lumber prices in the long run. My article was concerned with the lumber-price trend, or changes in lumber prices in the long run. The 3 percent discount curve in Figure 1 (my article) is a rough approximation of this trend.

Changes in lumber prices in the short period are determined primarily by changes in demand. Change in the lumber-price trend, however, is determined mainly by changes in costs of production.[2] The post-war housing boom mentioned by Mr. TerBush unquestionably has been one of the principal demand factors which pulled lumber prices upward so rapidly immediately after World War II.

As for the cost of stumpage, it is still too early to decide whether the post-war rise in stumpage prices is a short or long run phenomenon. If stumpage prices should remain at their present high level, or continue to increase at a faster rate than lumber prices, I agree with Mr. TerBush that stumpage prices will become an important factor in the lumber price trend.

Reliable data on labor productivity in the lumber industry for the post-World War period is not as yet available. Thus, it is impossible to determine whether improvements in logging and milling technology have more than offset continued adverse trends in timber quality, stocking, and location. However, the fact that lumber prices remained at a very high level after the post-war housing boom subsided suggests that labor productivity actually declined after World War II.

JOSEPH ZAREMBA

[2]Marshall, A. 1920. Principles of economics. 8th ed. Macmillan and Co. Ltd., London. p. 349.

Reviews

Forestry Terminology. A Glossary of Technical Terms Used in Forestry

Society of American Foresters. 97 pp. 3rd ed. Washington, D. C. 1958. $3.50.

Some standardization of word meanings clearly is essential to intelligent intercourse. Diplomats have discussed the difficulty of discourse with some of their counterparts such themes as democracy, imperialism, peace-loving, and war-mongering. In her familiar colloguy with Humty Dumpty, Alice objected that "glory" does not mean "a knock-down argument." "'When *I* use a word', Humpty Dumpty said, 'it means just what I choose it to mean—neither more nor less.' 'The question is,' said Alice, 'whether you *can* make the words mean so many different things.' 'The question is,' said Humpty Dumpty, 'which is to be master—that's all!' "

In its early infancy the Society of American Foresters became interested in the compilation and definition of its profession's terminology and, in cooperation with the Bureau of Forestry, U.S. Department of Agriculture, published in 1905 "Terms Used in Forestry and Logging" (Bur. For. Bul. 61, 53 pp.), providing a lexicon of 359 forestry and 615 logging terms. Following extensive criticism of and comment on this publication the Society later appointed a committee for terminology revision under the chairmanship of Dr. B. E. Fernow. This committee's report was published in two sections: (1) in the JOURNAL OF FORESTRY for January 1917 (Vol. 15, pp. 68-101) with 565 forestry terms defined, and (2) January 1918 (Vol. 16, pp. 1-75), under the subhead "Terms Used in the Lumber Industry," with 1,980 terms. This indicates, as contrasted with the 1905 list, a 57 percent increase in forestry terms while the lumber industry terminology was more than doubled.

In the fall of 1938 President C. F. Korstian appointed a much enlarged forestry terminology committee, with ten subcommittees, each with its own chairman, and under the general chairmanship of Prof. Ralph C. Hawley. The results of their labors was the first edition of *Forestry Terminology* published by the Society in 1944. This contained approximately 2,800 term definitions. As a result of a "Collating Committee," under the chairmanship of Edward N. Munns, a revised (second) edition of *Forestry Terminology* was published by the Society in 1950. This included about 3,850 terms, an increase of 37 percent. When this edition was exhausted, and in view of the fact that the terminology had now reached wide acceptance and the chief need appeared to be the addition of new terms, it was decided to issue a third edition, under the editorship of Arthur B. Meyer and F. H. Eyre, who were aided by consultants in specialized fields. This new work contains about 4,000 terms or a net increase of about 150 terms over edition 2.

It is difficult for the reviewer to do justice to a work of this sort, representing as it does the mature thought, over a half-century, of some of the best minds in the forestry profession and of many specialists. The book is an essential reference work for foresters and workers in allied fields. One difficult task confronting the authors has been consideration of any possibilities of reconciling their definitions with those of the Empire Forestry Association in such a work as *British Commonwealth Forest Terminology Part I* (London, 1953). That has not been altogether possible. In this connection it is of interest to compare the definitions of Forestry in the two books. The British define Forestry thus: "The theory and practice of the whole constitution and management of forests and the utilization of their products." Edition 3 of *Forestry Terminology* defines Forestry as: "The scientific management of forests for their continuous production of goods and services." The American definition emphasizes the multiple-use concept, services, and continuity of production which characterize the best forestry practice in this country.

In conclusion perhaps the reviewer may be pardoned for expressing pleasure that this latest text includes the term Dendrology, whose former omission he noted in his article "What is Dendrology?" (Jour. Forestry 43:719-722. 1945) and takes no umbrage that his preliminary (and prolix) definition has been considerably modified by the editors' crayons!

WILLIAM A. DAYTON
Arlington, Virginia

Forest Credit in the United States: A Survey of Needs and Facilities

Report of a Committee Appointed by Resources for the Future, Inc. 164 pp. Illus. Resources for the Future, Inc., Washington, D. C. 1958. $2.

Adequate forest credit in the last several decades has been touted as a panacea for the ills of improper forest management, especially those associated with small ownership. It is indeed refreshing to study a problem analysis on forest credit which is not only written for the lay forester but also places forest credit in its proper perspective among the maze of problems in need of solution to raise our standards of forestry practice.

This report, one of a number recently published by Resources for the Future, is the work of a com-

mittee composed predominantly of well-known foresters and representing research and administration, teachers and consultants, public and private employment, trade associations and lending agencies. M. R. Benedict, professor of agricultural economics at the University of California, was chairman of the committee. If the number of comments and dissenting opinions expressed in the footnotes of the report are indicative, this report was not written by one of the group and "rubber stamped" by his fellow members.

The report is divided into five chapters dealing with the nature of the forest credit problem, its past and present status. A remaining chapter summarizes the critical facets developed by the committee, places them in proper perspective in the overall problem of forest management, and attempts to point out those areas of forest credit in which there is need for more research, programming, and education.

A discussion of the place of credit in private forestry is followed by a discussion of the financial and operational aspects of private forestry with especial emphasis on those associated with and peculiar to small ownership. The section on forest credit problems and requirements discusses the various credit needs for forest land and production of forest products, again emphasizing needs as related to size and location of holding.

An entire section is devoted to the relation of forest insurance to credit and an analysis of the current situation in forest credit as recent as September 1957 is included.

In its summary, the committee outlines the characteristics of "adequate" credit for forestry and those areas in which "adequate" credit is now available, partly developed, or insufficient. It is interesting to note that the steps which the committee outlines as "looking to more adequate credit arrangements" center as much, if not more, on good land use, marketing, and forest management than on forest credit per se. Finally, the seven appendices include sections on pertinent bank loan laws and modifications, case studies of properties involving forest credit, and mortgage loan provisions.

Students of forest economics will, no doubt, sharply agree or disagree with the committee's analysis of private vs. public credit development, depending upon their own personal convictions. Nevertheless, most foresters will find this report an excellent source to bring them up to date in the increasingly important field of forest credit.

THOMAS C. NELSON
Kirby Lumber Corporation

Textbook of Dendrology

By William M. Harlow and Ellwood S. Harrar. 561 pp. Illus. McGraw-Hill, New York. 1958. $8.75.

Like its predecessors, the fourth edition of the well-known *Textbook of Dendrology* describes for beginning students of forestry the important forest trees of the United States and Canada.

The revised edition makes changes in nomenclature necessitated by the appearance in 1953 of U. S. D. A. Agriculture Handbook 41, "Check List of Native and Naturalized Trees." These changes involve several new specific epithets and revised spelling of older ones. There are also some changes in classification, in a few instances forms previously regarded as species have been combined.

The range maps have been completely reworked, and the book is illustrated by approximately 1,000 photographic halftones. A list of state trees is appended.

Publications of Interest

Paper: The Fifth Wonder combines in one book a series of 12 booklets, each dealing with a specific phase of pulp and paper manufacture, in digest form. It is profusely illustrated. Written by John H. Ainsworth and published by the Thomas Publishing Co., Kaukauna, Wis., the book sells for $4. All subjects are covered in simple, easy to comprehend form for the reader with no prior knowledge of this highly technical industry.

* * *

Preferred Forest Cutting Practices and Recommendations for Professional Foresters for Northern Ohio Forests Types, a 40-page booklet (mimeog.), has been prepared by the Forest Cutting Practices Committee for Northern Ohio, Ohio Chapter of the Central States Section, SAF. The price per copy is $1, and orders should be sent to the Chapter secretary-treasurer, Burl S. Ashley, 75½ N. Sandusky St., Delaware, Ohio.

* * *

Who handles forestry problems in Massachusetts? The answer is given in a booklet entitled *Forestry Services in Massachusetts.* Prepared by John H. Noyes, extension forester, the booklet describes agencies and organizations and the role each plays in conserving the state's natural resources. Names and addresses of people to contact are given for each. Copies may be obtained from the Cooperative Extension Service, College of Agriculture, University of Massachusetts, Amherst.

* * *

A new conservation chart teaching aid released by the Forest Service, U. S. Department of Agriculture, "What We Get From Forest Land," emphasizes the multiple-use principle of management of forest lands. It is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 20c per copy. Teachers may obtain single copies free from the Forest Service, Washington 25, D. C., or from other Forest Service offices. It cannot be supplied in quantity free for pupil or student use.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*

Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

The Menominee Indian Timber Case History; Proposals for Settlement. By H. H. Chapman, Yale Univ. School of Forestry, New Haven, Conn. 1957. 70 pp. Mimeog.

Nature and the American; Three Centuries of Changing Attitudes. By Hans Huth. 250 pp. Illus. Univ. of Calif. Pr., Berkley. 1957. $7.50.

The Tree Identification Book; A New Method for the Practical Identification and Recognition of Trees. By G. W. D. Symonds. 127 pp. Illus. Barrows, New York. 1958. $10.

Trees of the Eastern and Central United States and Canada. By W. M. Harlow. 288 pp. Illus. Dover, New York. 1957. $1.35.

Forest Influences

Forest Lands in Relation to Stream Basin Planning. By W. T. Murphy. 10 pp. (U. S. Forest Service.) Prepared for . . . annual meeting of the American Soc. of Agricultural Engineers . . . June 25, 1957. Mimeog.

Shelterbelts and Microclimate. By J. M. Caborn. 135 pp. Illus. Great Britain Forestry Commission, London. 1957. Bul. No. 29. 17s 6d.

Forest Management

Combined Taper and Volume Tables for Pinus ponderosa. By S. W. Burstall. 22 pp. New Zealand Forest Serv., Wellington. 1957. Research Notes No. 10.

Provisional Yield Tables for Oak and Beech in Great Britain. By W. T. Waters and J. M. Christie. 31 pp. Great Britain Forestry Commission, London. 1958. Forest Record No. 36.

Forest Resources

Forest Resources of Oconto County. 22 pp. Tables. Wis. Cons. Dept., Madison. 1957. For. Inventory Publ. No. 30.

Forest Statistics for the Mountain Region of Virginia. 1957. By M. B. Bryan. 52 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1958. For. Survey Release No. 52. Mimeog.

Management of the Forest Resources of Taiwan. By Shen-Hsiao Liu. 60 pp. Taiwan Forestry Research Inst., Taipei, Taiwan. 1956. Spec. Bul. No. 1.

Some References on Forests and Related Natural Resources. U. S. Forest Serv., Eastern Region, Upper Darby, Pa. 1958. 16 pp.

Logging and Milling

Advances in Sawing from Forest to Shop. By L. H. Reineke. 27 pp. U. S. Forest Products Laboratory, Madison, Wis. 1958. Rept. No. 2100.

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A Guide for Evaluating Black Walnut Sawlog Quality. By W. W. King. 20 pp. TVA, Norris. 1957. Rept. No. 218. Mimeog.

Lumber. 2d ed. By N. C. Brown and J. S. Bethel. 379 pp. Illus. Wiley, New York. 1958. $9.

Protection

The Development and Application of a Sequential Sampling Plan for Forest Tent Caterpillar in New York. By D. P. Connola, W. E. Waters, W. E. Smith, 22 pp. Illus. New York State Museum & Science Serv., State Educ. Dept., Albany. 1957. Bul. No. 366.

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Miscellaneous Insect Enemies of Southern Pines. Comp. by C. W. Chellman. 14 pp. Illus. Southern Forest Expt. Sta., New Orleans, La. 1958. Southern Forest Pest Reporter No. 21. Mimeog.

Range Management

Grass is the Wealth. By E. R. Jackman and Others. 15 pp. Illus. Oregon State Coll. of Agric., Ext. Serv., Corvallis. 1957. Ext. Bul. 770.

Grassland-Livestock Handbook. By the Joint Committee on Grassland Farming. Ed. 8, Rev. 48 pp. Illus. Univ. of Oklahoma Press, Norman. 1957. Available from American Petroleum Institute, 50 West 50th St., New York 20, N. Y.

Hauling Water to Sheep on Western Ranges. By S. S. Hutchings. 8 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1958. Leaflet No. 423.

High Plains Grasshopper; a Compilation of Facts About Its Occurrence and Control. By Claude Wakeland. 168 pp. Illus. Ref. Maps. U. S. Dept. of Agric., Washington 25, D. C. 1958. Tech. Bul. No. 1167. $1. (Govt. Print. Off.)

Interrelations of Methods of Weed Control and Pasture Management at Lincoln, Nebr., 1949-55. By D. L. Klingman and M. K. McCarty. 49 pp. Illus. Ref. U. S. Dept. of Agric., Washington 25, D. C. 1958. Tech. Bul. 1180. 25 cents (Govt. Print. Off.)

Rice Hulls Improve Drilling of Bitterbrush Seed. By E. C. Nord and B. Knowles. 5 pp. California Forest & Range Expt. Sta., Berkeley. 1958. Forest Res. Notes No. 134.

Seeding-Depth Trials with Bitterbrush (Purshia tridentata) *in Idaho.* By J. V. Basile and R. C. Holmgren. 10 pp. Intermountain Forest & Range Expt. Sta., Ogden, Utah. 1957. Res. Paper No. 54.

Sodium Borates Show Promise for Grass Control. By George Gaylord and E. I. Rose. 2 pp. Lake States Forest Expt. Sta., St. Paul, Minn. 1958. Tech. Note No. 515.

Recreation

Interpreting Our Heritage; Principles and Practices for Visitor Services in Parks, Museums, and Historic Places. By Freeman Tilden. 110 pp. Illus.

ALABAMA Polytechnic Institute, University of Florida, and Georgia foresters vie for the longest beard in the first annual conclave of southern forestry schools. Paul Bunyan stands behind his proteges.

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Univ. of N.C. Pr., Chapel Hill. 1957. $3.50.

Silviculture

Effect of Field Stratification on Douglas Fir Seed Germination. By D. P. Lavender. 8 pp. Illus. Oregon Forest Lands Research Center, Corvallis. Research Note No. 33.

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The Silvics and Plant Geography of the Genus Abies *in the Coastal Forests of British Columbia.* By R. L. Schmidt. 31 pp. Illus. British Columbia Forest Service 1957. Tech. Publ. No. 46. 50 cents.

Variation in Tracheid Length and Wood Density in Geographic Races of Scotch Pine. By R. M. Echols. 52 pp. Illus. Yale Univ. School of Forestry, New Haven. 1958. Bul. No. 64. $1.50.

Viability of Douglas Fir Seed After Storage in the Cones. By D. P. Lavender. 8 pp. Illus. Oregon Forest Lands Research Center, Corvallis. 1958. Research Note No. 31.

Wood Preservation

Absorption and Penetration of Preservatives Applied to Southern Pine Wood by Dips or Short-Period Soaks. By A. F. Verrall. 31 pp. Southern Forest Expt. Sta., New Orleans, La. 1957. Occas. Paper No. 157. Mimeog.

The Preservative Treatment of Wood for Farm Use. By J. O. Blew. 10 pp. U. S. Forest Products Laboratory, Madison, Wis. 1957. Rept. No. 2098. Mimeog.

Wood Technology and Utilization

The Growth and Structure of Wood. By B. J. Rendle. 20 pp. Illus. Great Britain Dept. of Scientific and Industrial Research, London. 1957. For. Prod. Res. Record No. 21. 1s 9d.

Utilization of Native Timber in Farm Buildings. By W. L. Roller. 18 pp. Ohio Agric. Expt. Sta., Wooster. 1958. Res. Bul. No. 807.

Society Affairs

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Annual Meeting

Society of American Foresters
Salt Lake City, Utah, September 29 - October 2, 1958

"Multiple-Use Forestry in the Changing West" is the theme of the 58th annual meeting, scheduled for Salt Lake City, September 29-30 and October 1-2.

Co-chairmen Floyd Iverson and Reed W. Bailey report that preparations are under way for one of the most interesting meetings of foresters ever sponsored by the Society. An attendance of one thousand is expected.

The meeting will be formally opened by President George A. Garratt at 9:30 a. m., Monday, September 29. George V. Hjort, past chairman of the Intermountain Section, the host Section, will be chairman of the first general session.

There will then follow the Society Affairs session, nine subject Division meetings, the annual dinner, and an all-day field trip.

Henry J. Malsberger, vice president of the Society, will preside as toastmaster at the Society's dinner on October 1, at which President Garratt will make two noteworthy awards. The Sir William Schlich memorial medal for distinguished service to forestry will be presented to an eminent American forester. Also to be presented will be the award for achievement in biological research leading to the advancement of forestry.

The featured speaker at the dinner will be Dr. Tom Gill, executive director of the Charles Lathrop Pack Forestry Foundation and Schlich medalist in 1954.

Ladies are welcome and invited. Special programs are being planned for them. Among their activities will be tours to the world famous copper mine at Bingham, Great Salt Lake, and the Alta winter sports area in the Wasatch Mountains.

The Field Trip

A field trip, for men only, will be made on Thursday, October 2 to the Davis County Experimental Watershed to inspect the watershed activities of the U.S. Forest Service and to see aerial forest fire fighting tactics. Travel will be by open trucks over 40 miles of mountain road into high country unsurpassed for geologic, historic, and scenic features. No private passenger automobiles will be permitted, in the interest of safety.

A box lunch with hot and cold beverages will be served. Clothing for cool mountain weather will be desirable.

The cost of the trip will be about $2.50.

Those desiring to take this trip will be required to register for it in advance. Note the hotel reservation form on page 605.

Schedule of Events

Saturday, September 27

Council of Forestry School Execu-

tives; morning and afternoon.

Sunday, September 28

SAF Council; morning and afternoon.

Editorial Board, JOURNAL OF FORESTRY; evening.

Association of Consulting Foresters, open meeting; evening.

Monday, September 29

Opening General Session, morning.

Society Affairs Session; afternoon.

Division of Education; evening.

Division of Forest Products; evening.

Division of Watershed Management; evening.

Tuesday, September 30

Division of Forest Management; morning and afternoon.

Division of Forest Recreation; evening.

Division of Forest Economics; evening.

Division of Forest-Wildlife Management; evening.

Wednesday, October 1

Division of Silviculture; morning and afternoon.

Division of Range Management; morning and afternoon.

Society Dinner; evening.

Thursday, October 2

Field Trip to Wassatch Watershed Management areas; morning and afternoon; men only.

Ladies' Scenic Tour; morning and afternoon.

General Meeting

Monday morning, September 29

George V. Hjort, Chairman

1. Welcome by the President, George A. Garratt.

2. "Management Planning for Future Multiple-Use Forestry on Western National Forests." Donald E. Clark, U. S. Forest Service, Denver, Colo.

3. "Our National Parks in the Dynamic Challenge of Outdoor Recreation." Lemuel A. Garrison, National Park Service, Yellowstone Park, Wyo.

4. "Our Citizens Among Our Trees." Fred J. Sandoz, Booth-Kelly Lumber Company, Springfield, Ore.

Society Affairs Session

Monday afternoon, September 29

George A. Garratt, President
Henry J. Malsberger, Vice President
Henry Clepper, Executive Secretary

1. Report of the President.

F. C. KOZIOL
Chairman, Committee on Arrangements

2. Report of the Executive Secretary.

3. Report of the Editor of Society Publications. Arthur B. Meyer.

4. Report of the Director of the Study of Education in Forestry and Related Fields of Natural Resources Management. Harold G. Wilm.

5. Report of the Editor of *Forest Science*. Stephen S. Spurr.

6. Report of the Committee on International Relations. V. L. Harper.

7. Report of the Council Committee on Membership. Henry J. Vaux.

8. Report of the Committee for the Advancement of Forestry Education. Harold G. Wilm.

Policy Issues

William D. Hagenstein, Moderator

Panel Discussion of Wilderness Preservation.

Panel Discussion of Aerial Spraying of Woodlands.

LEWIS M. TURNER
Chairman, Program Committee

Division of Education

Monday evening, September 29

A. Bigler Crow, Chairman
Peter W. Fletcher, Vice Chairman
William C. Bramble, Secretary

Symposium: "Is a Summer Camp Necessary in Forestry Instruction?"

1. "The Facts About Present Summer Camp Requirements and Instruction." Paul Y. Burns, School of Forestry, Louisiana State University, Baton Rouge, La.

2. "This is the Way *We* Do It, and Why."

John W. Barrett, College of Forestry, State University of New York, Syracuse, N. Y.

Richard J. Preston, School of Forestry, North Carolina State College, Raleigh, N.C.

Robert N. Colwell, School of Forestry, University of California, Berkeley, Calif.

3. "We Don't Require a Summer Camp Because . . ." W. F. McCulloch, School of Forestry, Oregon State College, Corvallis, Ore.

4. Discussion. Moderator, William C. Bramble, Department of Forestry and Conservation, Purdue University, Lafayette, Ind.

5. Business session and election of officers.

Division of Forest Products

Monday evening, September 29

Harry E. Troxell, Chairman
Bernard M. Granum, Vice Chairman
Rudolph Grah, Secretary

1. "Logging Methods in High-Altitude Forests of the Central Rocky Mountains." Francis R. Herman of Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

2. "Logging in Recreational Areas." Ralph D. Hodges, Jr., Big Bear Timber Company, Redlands, Calif.

3. "Automated Sawmills — The Answer to the Small Log Problem." Milton H. Mater, Mater Machine Works, Inc., Corvallis, Ore.

4. "Putting the Handicapped Species to Work." Edward S. Kotok, Intermountain Forest and Range Experiment Station, Ogden, Utah.

5. "The Manufacture of Flapreg from Residue Wood." John W. Talbott, Department of Forestry and Range Management, State College of Washington, Pullman, Wash.

Division of Watershed Management

Monday evening, September 29

Peter W. Fletcher, Chairman
Sidney Weitzman, Vice Chairman
Jack S. Rothacher, Secretary

1. "Watershed Management Problems of the Intermountain West." George W. Craddock, Intermountain Forest and Range Experiment Station, Ogden, Utah.

2. "The Forest Service Soil and Water Management Program in the Intermountain Region." L. K. Clark and Edward L. Noble, U. S. Forest Service, Ogden, Utah.

3. "Getting a Watershed Management Program Started on a Municipal Watershed — The Experience of the City of Meridian, Mississippi." Arthur W. Nelson, Jr., Champion Paper and Fibre Company, Hamilton, Ohio.

4. "From Forest Influences to Applied Watershed Management in Southern California." Walter S. Hopkins, California Forest and Range Experiment Station, Berkeley, Calif.

5. "The Beaver Creek Project — A Pilot Test of Watershed Management." Earl F. Aldon, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

6. "Rainfall and Streamflow Relationships, Salt River System, Arizona." Lowell R. Rich, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

7. "Use of a Nuclear Soil Moisture Meter in Evapo-transpiration Studies on Mountain Soils." Richard B. Marston, Intermountain Forest and Range Experiment Station, Ogden, Utah.

8. "The Fool Creek Watershed Study—A Progress Report." Bertram C. Goodell, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

9. "Snow in Forest Openings and Forest Stands." H. W. Anderson, Raymond M. Rice, and Allan J. West, California Forest and Range Experiment Station, Berkeley, Calif.

10. "Interception of Rainfall Under Nine Densities of Pole-size Ponderosa Pine." Earl F. Aldon and Willie R. Curtis, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

11. Business meeting.

Division of Forest Management

Tuesday morning, September 30

Walter F. McCulloch, Chairman
Russell K. LeBarron, Vice Chairman
Raymond R. Moore, Secretary

Russell K. LeBarron, Session Chairman

1. "Pest Action Councils, Their Objectives and Accomplishments." E. L. Kolbe, Western Pine Association, Portland, Ore.

2. "Forest Insect Pest Surveys, Their Status and Needs." J. W. Bongberg, U. S. Forest Service, Washington, D.C.

3. "Animal Pest Problems and What Needs to be Done About Them." R. D. Moody, International Paper Company, Mobile, Ala.

4. "Where Do We Stand Now on Disease Control?" R. O. Cornelius, Weyerhaeuser Timber Company, Tacoma, Wash.

5. "The Forest Pest Situation in the Intermountain Area." D. E. Parker, Ogden, Utah.

6. Business session.

Tuesday afternoon, September 30

James L. Mielke, Session Chairman

1. "Logging — The Key to Forest Management." Steele Barnett, Boise Cascade Corporation, U. S. Forest Service, Boise, Idaho.

2. "Recent Trends in Management of Rocky Mountain Lodgepole Pine." David Tackle, U. S. Forest Service, Missoula, Mont.

3. "Forest Management Problems in the Engelmann Spruce-Subalpine Fir Forest Type." A. L. Roe, U.S. Forest Service, Missoula, Mont.

4. "Aspen Management in Utah." Joel L. Frykman, U.S. Forest Service, Ogden, Utah.

5. "Management Problems in the Juniper-Pinyon Type." J. Whitney Floyd, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

Division of Forest Economics and Policy

Tuesday evening, September 30

S. Blair Hutchinson, Chairman
John A. Zivnuska, Vice Chairman
Robert Keniston, Secretary

Symposium: "Measuring the Importance of Watersheds in our Future Economy."

1. H. R. Josephson and Ellis T. Williams, Division of Forest Economics, U.S. Forest Service, Washington, D.C.

2. Roy E. Huffman, Division of Agriculture, Montana State College, Bozeman, Mont.

3. E. I. Kotok, Branch of Research, U.S. Forest Service (retired): Walnut Creek, Calif.

Division of Forest Recreation

Tuesday evening, September 30

F. C. Koziol, Chairman
F. W. Childs, Vice Chairman
William A. Parr, Secretary

1. "How Much Land for Forest Recreation?" Moderator: J. Whitney Floyd, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

Panel: Henry A. Harrison, Division of Land Use and Recreation, U. S. Forest Service, Washington, D. C.

James Tyndall, Cook County Forest Preserve, Chicago, Ill.

James P. Gilligan, Extension Service, University of California, Berkeley, Calif.

Chester J. Olsen, Utah Parks and Recreation Commission, Ogden, Utah.

2. "The Case for Wilderness Preservation Legislation." Howard Zahniser, The Wilderness Society, Washington, D. C.

3. "The National Outdoor Recreation Resources Review Objectives." Kenneth B. Pomeroy, The American Forestry Association, Washington, D. C.

4. "Public Recreation and Industrial Forestry." Frederick Billings, Weyerhaeuser Timber Company, Cosmopolis, Wash.

Division of Forest-Wildlife Management

Tuesday evening, September 30

William L. Webb, Chairman
Elbert H. Reid, Vice Chairman
Odell Julander, Secretary

1. "Seasonal Progression in the Chemical Content of Five Browse Species on Winter Range." Lee E. Yeager and Donald R. Dietz, Colorado Cooperative Wildlife Research Unit, Fort Collins, Colo.

2. "Effects of Fire on Alaskan Wildlife." John L. Buckley, Alaska Cooperative Wildlife Research Unit, College, Alaska.

3. "Conflicts and Integration in the Management of Forests and Deer." Lowell Adams, Susanville Research Center, Susanville, Calif.

4. "Current Status and Needs for Wildlife Habitat Research in the South." Lowell K. Halls and Robert Blair, U. S. Forest Service, Southern Forest Experiment Station, New Orleans, La.

5. "Blue Grouse in Colorado." Harold W. Steinhoff, Department of Forest Recreation and Wildlife Conservation, Colorado State University, Fort Collins, Colo.

6. "Deer Enclosure Studies in Longleaf Pine." Phil D. Goodrum, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Nacogdoches, Tex.

7. "Growth and Development of Red Alder Compared with Conifer in 30-year-old Stands." Carl M. Berntsen, Pacific Northwest Forest and Range Experiment Station, Corvallis, Ore.

Division of Silviculture

Wednesday morning, October 1

James D. Curtis, Chairman
William H. Cummins, Vice Chairman
Richard D. Rosenberg, Secretary

1. "Chemistry in the Service of Silviculture." Nicholas T. Mirov, California Forest and Range Experiment Station, Berkeley, Calif.

2. "Individual Tree and Stand Evaluation from Increment Cores." Robert M. Echols, Southern Institute of Forest Genetics, Southern Forest Experiment Station, Gulfport, Miss.

3. "Contribution to a Better Understanding of the Process of Natural Reproduction in California." Dietrich Muelder, School of Forestry, University of California, Berkeley, Calif.

4. "Effect of Low Competition on Longleaf Pine Seedling Growth." David Bruce, Southern Forest Experiment Station, New Orleans, La.

5. "Seasonal Periodicity in Root Regeneration on Ponderosa Pine Transplants — A Physiological Condition." Edward C. Stone, School of Forestry, University of California, and Gilbert H. Schubert, California Forest and Range Experiment Station, Berkeley, Calif.

6. "Basic Concepts of Hardwood Silviculture." Leon S. Minckler, Central States Forest Experiment Station, Carbondale, Ill.

Wednesday afternoon, October 1

1. Business meeting and election of officers.

2. Report of the Committee on Natural Areas. John F. Shanklin, U. S. Department of Interior, Washington, D.C.

3. Report of the Committee on Tree Improvement. Bruce J. Zobel, School of Forestry, North Carolina State College, Raleigh, N.C.

4. Panel Discussion: "Chemicals in Silviculture."

Moderator, Theodore W. Daniel, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

"Herbicides." Harold R. Offord, California Forest and Range Experiment Station, Berkeley, Calif.

"Fertilizers." Stanley P. Gessel, College of Forestry, University of Washington, Seattle, Wash.

"Systemics." John H. Rediske, Weyerhaeuser Timber Company, Centralia, Wash.

"Poisons and Repellents." D. A. Spencer, Wildlife Research Laboratory, Denver, Colo.

Division of Range Management

Wednesday morning, October 1

Elbert H. Reid, Chairman
Grant A. Harris, Vice Chairman
Joe A. Wagner, Secretary

Theme: "Manipulation of Range Vegetation."

Program not received.

Wednesday afternoon, October 1

Theme: "Grazing in Multiple Use of Forest and Range Lands."

Program not received.

The Society Dinner

Wednesday evening, October 1

Henry J. Malsberger, Toastmaster

1. Presentation of the Sir William Schlich memorial medal by President Garratt.

2. Presentation of the Society of American Foresters award for achievement in biological research by President Garratt.

3. Address by Tom Gill, Charles Lathrop Pack Forestry Foundation, Washington, D.C.

4. Entertainment.

Committees for the Meeting

The general co-chairmen for this meeting are Floyd Iverson, U. S. Forest Service, Ogden, Utah; and Reed W. Bailey, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Chairman of the Program Committee is Lewis M. Turner, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

The chairman of the Committee on Arrangements is F. C. Koziol, U. S. Forest Service, Federal Building, Salt Lake City, Utah.

Hotel Reservations

Those expecting to attend the meeting are advised to arrive in Salt Lake City on Sunday, September 28, or not later than 9 a.m., on Monday, September 29. The first general session will start at 9:30 a.m., Monday, in the auditorium of the new Utah Hotel Motor Lodge convention center.

The Utah Hotel, facing Temple Square, will be the headquarters for the meeting. This hotel has 500 rooms, but it will not be able to accommodate all those in attendance, hence other hotels are making space available, including Utah Hotel's new Motor Lodge, also adjacent to Temple Square.

All requests for room reservations should be sent to the SAF Housing Committee, in care of the Convention Bureau of the Chamber of Commerce, P.O. Box 329, Salt Lake City 10, Utah. Second and third choices should be given.

Reservations will be accepted and confirmed in the order of their receipt. Assignment of rooms will be made at, or as near, the desired rate as possible. Early reservation requests are desirable.

The reservation coupon printed herewith may be used. However, readers who do not want to cut the coupon from their JOURNALS may request reservations by letter, provided all the information listed on the coupon is given.

Hotels

All rates quoted are with bath; these are daily rates.

Utah Hotel, South Temple and Main Streets; 500 rooms; garage attached. Single occupancy: $8, $9, $10, $11, $12, $13, $14. Double-bed rooms: $10, $11, $13, $14, $15, $16, $17. Twin-bed rooms: $11, $12, $13, $15, $16. Suites (sitting room, bedroom, and bath): single occupancy, $18 and up; double occupancy, $20 and up.

Utah Hotel Motor Lodge, West Temple Street facing Temple Square; 100 units; parking facilities. Single occupancy: $8 to $14. Double-bed rooms: $10 to $17. Twin-bed rooms: $12 to $17.

A rollaway bed may be brought in for an additional adult either at the Utah Hotel or Motor Lodge, the charge for which is $2 daily.

Temple Square Hotel, 75 West Temple and South Temple Streets, facing Temple Square; 188 rooms. Single occupancy: $5 to $7.50. Double-bed rooms: $7 to $9. Twin-bed rooms: $9 to $11. Rooms with three beds: $11 to $13.

Newhouse Hotel, Main at 4th South Streets; 400 rooms; adjacent garage; four blocks from Utah Hotel. Single occupancy: $6.50 to $9. Double-bed rooms: $8.50 to $12. Twin-bed rooms: $9 to $13. Suites: $20 to $32.

There are other hotels in Salt Lake City. The Convention Bureau will make reservations at hotels other than those listed above if members desire lower rates.

Motels and Motor Lodges

Salt Lake City has more than 30 motels. A complete list of them, together with their address and daily rates may be obtained on application to the Convention Bureau, P.O. Box 329, Salt Lake City 10, Utah.

In requesting a reservation at a motel, payment equal to the daily rate but in no case less than $6 should ac-

company the reservation request.

The following six motels are listed as they are less than six blocks from the Utah Hotel.

Brewster's Seagull Motel, 325 North 2nd Street West; $6.50 to $8.50.

City Center Motel, 134 West North Temple Street; $7.50 to $12.

Covered Wagon Motel, 230 West North Temple Street; $6 to $13.50.

Covey's New American Motel, 522 South Main Street; $6 to $12.

Deseret Inn Motor Hotel, 50 West 5th South Street; $8 to $18.

Western Motor Lodge, 323 West North Temple Street; $7 to $11.

The Council's Column

How Well Does the Public Know the Forester?

It is an encouraging and stimulating experience to attend meetings of our profession at either the national, Section, or Chapter level and observe the increased number of foresters participating. It is a very definite sign of the professional interest, and the increased employment is also an acknowledgment on the part of private forest landowners, including wood-using industries and public agencies, of the need of the practicing forester to tend the forest resource.

The technical quality of these discussions has definitely improved, including a broadening of interests into various related scientific fields, with the realization that all of these are absolutely essential to enable the forester to do a creditable job of managing the forest resource. The profession within itself has recognized this need and has definitely taken steps to meet the "new look" for the forestry profession.

An increasing number of foresters are being employed in positions with wood-using industries where their decisions influence forest policy. This same trend is apparent among the federal and state agencies dealing with the forest as well as related resources and where benefits, in addition to the production of forest products, are essential to the public welfare.

Such a partial explanation of the reason for increased employment of foresters and their technological advance indicates we are known as a profession and the services of the forester are in demand by those who

Society of American Foresters

1958 ANNUAL MEETING

SALT LAKE CITY, UTAH SEPTEMBER 29 AND 30-OCTOBER 1 AND 2

Housing Committee, Society of American Foresters,
c/o Chamber of Commerce Convention Bureau,
P.O. Box 329,
Salt Lake City 10, Utah.

First choice hotel .....

Second choice hotel .....

Third choice hotel .....

Please make a reservation for the following room accommodations for arrival on September....., a.m. Departure....., a.m.
p.m. p.m.

I understand that accommodations will be provided at the daily rate specified, if available; otherwise the next nearest rate will apply.

..... Single room with bath. Rate $.....

..... Double-bed room with bath. Rate $.....

..... Twin-bed room with bath. Rate $.....

..... Suite (parlor, twin-bed room, and bath). Rate $.....

..... Other. (Specify accommodations desired.) Rate $.....

The above accommodations are requested for the following persons in addition to myself. (Please print or typewrite names and addresses legibly.)

.....

.....

.....

My name: .....

Street address: .....

City, zone, state: .....

Important notice: Members submitting requests for hotel reservations are asked to check below whether they wish to go on the all-day field trip for men on Thursday, October 2. This trip is described elsewhere in the program of events. The number who can be accommodated is limited.

☐ I do ☐ I do not—wish to go on the field trip.

know us. But—how well does the public know us as a profession and as individual foresters?

In this day of relatively enlightened interest in forestry, it is my impression that there remain large segments of the public which do not clearly understand what we do or how we do it. I have the opportunity to serve on various committees to select outstanding high school graduates for the honor of receiving forestry scholarship awards made available by pulp and paper companies in the South. The boys competing for these scholarships have excellent scholastic records, are well-rounded in extra curricular-activities and are very promising applicants in all respects. High standards of qualifications have been prescribed for these competitive awards by high school superintendents and forest school administrators in cooperation with the industry. One of the requirements is a statement by the boy indicating his reason for deciding upon forestry as a career. Invariably, the majority of these statements include something to the effect that he likes the out-of-doors, and particularly to hunt and fish. This is, indeed, an admirable desire and certainly one which every forester seeks to achieve, but it is quite possible that it constitutes a rather general impression the public has of the complete work of the forester.

We have been so engrossed doing a forestry job for the past several decades, which within itself is an admirable attribute, we have not taken time to adequately tell anyone else what we are doing. Since we have not adequately informed this public, it can quite logically arrive at wrong conclusions. No doubt a better selling job of our profession could have helped avert the difficulty now experienced in attracting enough well qualified boys to forestry, in competition with other professions.

The forester of today and tomorrow must not only be a trained technician performing his work with the greatest degree of skill and competence, but he also must be inclined to take time to tell his neighbors what he is trying to accomplish and how he goes about it. This is particularly true in the case of the forester who engages in forestry work for the first time in rural communities. The property owners, as well as the surrounding residents, are very curious about the effect, for instance, of the first program they have observed of eradicating undesirable hardwoods in a forest. They do not understand the forester's reason; they question it, and can proceed to create very unfavorable publicity for the work of the forester. This can be true regardless of whether the forester is employed by a federal or state agency or a forest industry. The situation very likely could be completely avoided if the forester would take these people into his confidence before the work commences, fully explaining his reasons and anticipated results. He has the further opportunity of leading these surrounding forest owners into performing the same practices on their lands.

Each individual forester, therefore, working in the field or in a top administrative position must not only necessarily be of sound technical training, using good judgment in applying this knowledge, but also needs to be an ambassador, acquainting other people with the aims and objectives of his profession. This effort should not be considered extra curriculum but become an unconscious part of his daily job.

H. J. MALSBERGER

New Jersey Action Protested

Society of American Foresters

New Haven 11, Connecticut
June 4, 1958

Chairman
New Jersey Civil Service Commission
State House
Trenton, New Jersey

Dear Sir:

I am writing with reference to an apparent change in policy of your Commission which, as a professional forester and current president of the Society of American Foresters, gives me a great deal of concern. I have long had a great respect for the quality of New Jersey's government, the careful selection of employees and their tenure provided through your Commission. As a forester and educator, I have had numerous contacts with employees of the State of New Jersey and so feel qualified to hold a definite opinion of your activities.

In my own field of professional endeavor, there have been many and rapid advances in knowledge and application during the last 30 years. With this increasing knowledge, additional stress on training and more careful selection of personnel are necessary, if Civil Service employees are to be proficient in their service to the public.

Hence, I was shocked to learn recently that, for the first time in history, a man with only a high school training was admitted to an examination in New Jersey for the grade of Assistant Forester. This, despite the fact that, in your announcement of this examination, you stated that one of the requirements was "formal education or other education or training showing attainment of the level represented by graduation from college with specialization in forestry," with a second requirement of "one year of experience in large scale professional forestry work. . ." Since the man in question, Clyde Birdsall, has had only laborer and foreman jobs (as a local fire warden, laborer, foreman, etc.), and his training and experience are otherwise confined to such jobs as carpentering and running a sawmill, I cannot understand how he was considered qualified—particularly since in 1957 he was refused admittance to your Junior Forester examination, your beginning grade in professional forestry. This admission is all the more difficult to understand, since in the past you have maintained high standards by refusing admittance to such examinations to men who had attended, but did not graduate from college and who had far more responsible experience than Birdsall has had.

In view of the increasing forestry knowledge and responsibility it is hoped that your Commission will actually strengthen its requirements for Civil Service positions in the Junior Forester, Assistant Forester, and other professional forestry grades by stipulating that candidates for such positions must hold a *bachelor's or higher degree in forestry from a college or university accredited by the Society of American Foresters.*

As the president of a Society that is interested in maintaining high professional standards, I feel compelled to call this matter to your attention. I hope that action will be taken by your Commission to correct the indicated situation and avoid the recurrence of such unqualified appointment.

Very truly yours,

/s/ GEORGE A. GARRATT
President,
Society of American Foresters

State of New Jersey
Department of Civil Service

Dear Mr. Garratt:

Your letter addressed to the Governor concerning the admission of candidates to the examination for Assistant Forester, has been referred to me for reply.

The application for Clyde Birdsall was reviewed by the Chief Examiner and Secretary in accordance with the New Jersey Civil Service Laws, Rules and Regulations, and it was his decision, in accordance with these laws, that Mr. Birdsall be admitted to the examination.

It might be pointed out that the aforementioned action was only admittance to the examination. It did not mean that Mr. Birdsall would pass the examination which was prepared on a college level.

Sincerely yours,
RAYMOND F. MALE
President

George A. Garratt, President
Society of American Foresters
New Haven, Connecticut
June 17, 1958

Coming Events

Conservation Education Association

The CEA will hold its fifth annual conference at the University of Utah, Salt Lake City, August 18-21.

N. E. Tree Improvement Conference

The Northeast Tree Improvement Conference will be held at Beltsville, Md., August 21-22.

North American Forest Soils Conference

The North American Forest Soils Conference is scheduled for September 8-11 on the campus of Michigan State University, East Lansing.

Soil Conservation Society

City Auditorium, Asheville, N. C. will be headquarters for the 13th annual meeting of the Soil Conservation Society October 19-22.

American Forestry Association

The 83rd annual meeting of the American Forestry Association will be held in Tucson, Ariz., October 27-30, 1958. Headquarters will be the Pioneer Hotel. Meeting theme: "Water, Forests, and People."

The June issue of *Forest Science*, Volume 4, no. 2, carries the following papers.

Distribution of Reaction Wood in Eastern Hemlock as a Function of its Terminal Growth

Receptivity of Female Strobili of White Spruce

Rooting Cuttings of White Pine

Hydrogen Peroxide for Rapid Viability Tests of Some Coniferous Tree Seeds

Studies of Regeneration in Forest Stands Devastated by the Spruce Budworm, II

Respiration of White Pine Buds in Relation to Oxygen Availability and Moisture Content

Proliferated Cones of Douglas-Fir

Susceptibility of Southern Pines and Other Species to the Littleleaf Pathogen in Liquid Culture

Site-Quality Relationships of Pine Forests in Southern Arkansas and Northern Louisiana.

Forest Science, a quarterly journal of research and technical progress, is published by the Society of American Foresters, Mills Building, Washington 6, D.C. Subscription price is $6 per year. Back issues are available.

Comments on Wilderness Preservation Policy

To the Editor:

The policy adopted on wilderness preservation by the Council at its March meeting is one which bears further scrutiny by the membership of the Society, particularly the two points stressed: the concept of multiple use, which the resolution implies is applicable to wilderness areas without qualification; and the responsibility for the determination of wilderness area boundaries which the resolution states is the duty of the personnel charged with their administration.

With respect to the multiple-use concept it would have been helpful if the Council had made clear that wilderness areas are zoned as such to exclude uses involving commodity exploitation and developments requiring construction; and that some multiple-uses are not permitted, including timber harvesting, hydro-power development, and recreational structures of a commercial nature. The regulations issued by the Secretary of Agriculture confined the multiple-uses in these areas to recreational, watershed, and wildlife purposes.

A type of management which has meant primarily protection from natural and man-made hazards has become accepted as a necessary and desirable policy by nearly everyone. Senate bill 1176 which has been called the "Wilderness Bill" introduced by Senator Humphrey and others toward which this resolution is directed disturbs this established qualified multiple-use concept not one whit. It does clarify multiple-use to mean something more than a slogan as it applies to wilderness.

The responsibility for determining the boundaries of these areas is given by Congress to the Department of Agriculture in broad, sweeping legislation enacted 60 years ago. The Secretary of Agriculture has delegated their administration to the Forest Service as his administrative body, not to the personnel of the Forest Service—a minor but important point.

The fear that the wilderness areas which were created by the stroke of a pen could also be opened to commodity uses by the same process has led to the feeling that they should be given a more solid legal status than the administrative regulations. They are clearly vulnerable to shifting political winds, for the Secretary of Agriculture is a political appointee necessarily committed to the policies of the party in power. (The personnel in charge of wilderness areas are executors of policies—not formulators; and they are directly responsible for carrying out the policies of the Secretary whatever they may be.)

This is a matter which does not question the integrity of professional administrators in any way. It is simply a fact of life. Both as a means of establishing wilderness areas more securely in law than is possible under administrative regulation, and of clarifying the responsibilities of the personnel charged with their administration, the Wilderness Bill would serve a very useful purpose. Any changes would have to go through the Congressional sanction since the Congress is ultimately responsible to the people for their creation.

The Society's Council could do an extremely useful service in clarifying the multiple-use concept by developing a set of guiding principles which might be used for classifying all types of lands for various combinations of

multiple or single uses. The idea that all uses must go on in the same area at the same time is leading to considerable confusion. It could be disastrous when it is misapplied to the few bits of undisturbed wilderness which remain as a sample of the huge areas of frontier so important in their impact on our country's development and our national character.

CHARLES H. STODDARD
Washington, D. C.

Florida Chapter to Collect Photos

The History of Forestry Committee, Florida Chapter, Southeastern Section, SAF, is collecting old photographs and pictures of forestry activities of the early days of Florida. Members hope to prepare an album or booklet to show such phases of early forestry as logging scenes, lumber manufacturing, and naval stores operations.

Any contributions should be mailed to Mr. P. W. Frazer, School of Forestry, University of Florida, Gainesville, and should include any information available about the scene such as where, when, what mill or operation.

Membership Certificate Increase

Effective June 1 cost of membership certificates became $1.50 each. These certificates are available to Members only; those in Junior and other grades of membership do not qualify.

The certificate, suitable for framing, is 14 × 18 inches. The Member's name is hand-lettered and the Society's gold seal attached. Inasmuch as these certificates are hand-lettered outside the Society's office, orders are held until a sufficient number warrants the attention of the draftsman.

Cyril E. Walmsley (1922-1958)

Cyril E. Walmsley of Sheldon, Wash., was killed April 12 at McChord Air Force Base, Wash., when an Air Force reserve plane in which he was riding crashed. He was a captain in the Air Force Reserve.

Mr. Walmsley was born September 7, 1922 in Calgary, Alberta, Canada. He received his B.S. degree in Forest Management in 1948 from the University of Washington. After graduation he joined the Simpson Logging Company, and was employed there at the time of his death.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of June are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of September 1958.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

Slagle, R. E. Ruppert, C. V.

Junior Grade

Graham, J. D., 168 Juniper Drive, Levittown, Pa. (Reinstatement).
Knerr, T. R., Special Student, Pa. State, Centre Hall, Pa.; Pa. State, B.S.F., 1948.

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY

Anderson, R. D.	Pasquarella, M. J.
Balok, V. B.	Rotell, A. J.
Crates, J. A.	Schaeffer, R. M.
Devlin, R. J.	Schall, R. L.
Durkas, A. P.	Schell, K. F.
Frank, A. J.	Schmid, G. M.
Frank, J. M.	Shain, L.
Heilig, R. E.	Smith, T. W.
Hobaugh, M. E.	Stutzman, R. B.
Hollenbaugh, W. C.	Swartz, K. D.
Jacobs, R. D.	Truitt, W. W.
O'Connell, M. W.	Wermlinger, D. E.
Odell, R. L.	Zimmerman, J. R.

WEST VIRGINIA UNIVERSITY

Denham, D. E.	Pfanstiel, J. F.
Harman, H. G.	Rinehart, J. M.
Haywood, L. P.	Summerfield, C. E.
Hershberger, G. H.	Swank, W. T.
Moser, J. W.	Wingfield, B. G.
O'Dell, A. W.	Winters, R. O.

Yokum, H. J.

Member Grade

Frank, R. M., Forester, USFS, Upper Darby, Pa.; Pa. State, B.S.F., 1954, M.F., 1956.

Appalachian Section

Junior Grade

Students Eligible for Automatic Advancement

DUKE UNIVERSITY

Flora, R. L.	Row, C.
Phipps, H. M.	Wilt, D. L.

Wyrick, J. L.

NORTH CAROLINA STATE COLLEGE

Brown, R. A.	Grady, C. R.
Donegan, A. W.	Hills, C. C.
Eakins, T. A.	Sawyer, G. E. J.
Erwin, H.	Simmons, R. C.
Fortin, J. B.	Thompson, D. M.

Torrence, D. L.

Member Grade

Jolly, A. L., Dist. Forester, Va. Div. of Forestry, Salem, Va. (Reinstatement).
Hurlbutt, B., Dist. Forester, S. C. State Comm. of Forestry, Walterboro, S. C. (Junior 1955).

Affiliate Grade

Garner, J. W., Salem, Va.
Keithley, R. L., Colora, Md.
Leverty, R. G., Recreation Planner, Geo. Wash. Nat'l Forest, Harrisonburg, Va.

Central Rocky Mountain Section

Student Grade

Kline, J. D. Swanson, R. H.

Junior Grade

Students Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY

Adair, K. T.	Laird, L. L.
Campbell, D. I.	Lees, J. A.
Carr, V. L.	MacIntyre, D. C.
Easley, F. N.	Mathers, J. R.
Feller, L. F.	Meyer, V. M.
Hessel, D. L.	Newlin, P. N.
Hughes, J. M.	Orvig, C. G.
Kaltenbach, R. W.	Schroeder, J. G.
Knox, A. R.	Wilson, R. K.

Central States Section

Junior Grade

Students Eligible for Automatic Advancement

PURDUE UNIVERSITY

Baltzell, J. T.	Hutchison, J. S.
Clawson, G. L.	Norton, L. L.
Corsmeier, F. A.	Robinson, O. H.
Girton, D. S.	Schultz, R. D.
Harlan, R. D.	Sharp, B. G.
Harshberger, T. R.	Whittaker, J. C.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Henning, C. C. Ingram, E. F.
Mays, L. K.
Olson, H. J. (Reinstatement)

Junior Grade

Baker, L. A., Forest Nursery Supt., State Forest Nursery, Elkton, Ore.; Utah State, B.S.F., 1939, Ore. State, M.F., 1941.
Olson, H. J., Forester, Ore. State Board of Forestry, Salem, Ore.; Univ. of Wash., B.S.F., 1957, (STS56).

Students Eligible for Automatic Advancement

OREGON STATE COLLEGE

Arndorfer, R. W.	McAndrews, K. M.
Barringer, J. D.	O'Leary, R. E.
Barton, E. R.	Peckham, J. R.
Bell, T. E.	Poppino, J. H.
Bousfield, W. E.	Pryor, R. A.
Brown, E. H.	Ready, S. R.
Buffam, P. E.	Robles, R. K.
Carter, R. B.	Sager, W. H.
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Cory, W. N.	Sheaffer, T. A.
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Malone, J. E. — Wright, W. H.
Zechentmayer, R. D.

Member Grade

Coughlan, B. M., Dist. Logging Engineer, USFS, Tiller, Ore.; Ore. State, B.S.F., 1953, (Junior 1953).

Fisher, A. K., Resident Engineer, Willamette Valley Lbr. Co., Dallas, Ore.; Iowa State, B.S.F., 1950, (Junior 1954).

Kischel, R. E., County Land Agent, Roseburg, Ore.; Ore. State, B.S.F., 1948, (Junior 1954).

Affiliate Grade

Abolins, E. V., Forester, Dept. of Interior, Coos Bay, Ore.

Gulf States Section

Student Grade

LOUISIANA STATE UNIVERSITY

Forbes, D. C.

Junior Grade

Prather, W. A., Self Employed, Waynesboro, Miss., (Affiliate 1953).

Shealy, J. C., Asst. County Agent, Agriculture Extension Service, Minden, La.; L.P.I., B.S.F., 1949.

Students Eligible for Automatic Advancement

LOUISIANA POLYTECHNIC INSTITUTE

Bishop, J. E. — Kent, R.
Bryant, J. M. — Mercer, W. D.
Carlock, G. M. — Neill, B. J.
Davis, W. — Poland, B. C.
Finton, J. P. — Tolar, E. E.
Howe, J. E. — Weber, W. P.
Hutchins, J. E. — Wells, G. R.
Jordan, M. L. — Williams, B. H.

LOUISIANA STATE UNIVERSITY

Anderson, K. A. — Hinson, M. R.
Bonner, F. T. — Krause, C. M.
Branton, D. W. — Monk, J. R.
Burchfield, O. K. — Munday, C. P.
Capel, J. C. — Richardson, R. W.
Carpenter, B. E. — Rodgers, T. E.
Gordy, P. R. — Sanders, R. W.
Harper, D. L. — Storall, A.

Affiliate Grade

Stucker, M. D., Dist. Forester, Texas Forest Service, Kirbyville, Tex.

Townsley, F. S., Logging Supt., Olin Mathieson Chemical Corp., Winnfield, La.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Mondich, P. L.

Junior Grade

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UNIVERSITY OF IDAHO

Bower, D. R. E. — Peterson, T. R.

Cornell, B. L. — Rogers, G. L.
Hill, R. B. — Smith, T. W. R.
Hook, J. R. — Smithey, G. G.
Hoots, T. A. — Stairs, W. D.
Kokko, G. K. — Wilson, D. D.

New England Section

Junior Grade

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UNIVERSITY OF MAINE

Bowen, A. T. — Lane, J. M.
Brink, D. T. — Lyon, G. H.
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Finley, R. W. — Rast, G. F.
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Howard, J. K. — Tiffany, C. P.
Johnson, A. M. — Welch, J. A.
Kutz, C. F. — Wetzel, L. K.
Willcox, L. L.

UNIVERSITY OF MASSACHUSETTS

Campbell, A. — Conner, J. J.
Castaldini, R. E. — Osgood, W. H.

YALE UNIVERSITY

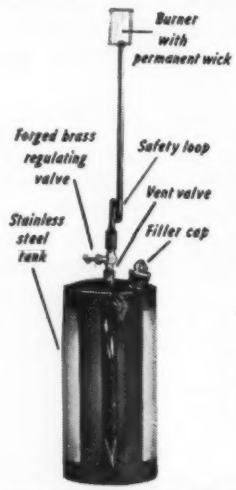
Barker, G. R. — Kurmes, E. A.
Crouse, R. P. — Lawson, D. L.
Haalck, H. G. J. — Makel, W. J.

Affiliate Grade

Chase, D. H., Asst. County Forester, Rockingham County Extension Service, Exeter, N. H.

New York Section

Student Grade



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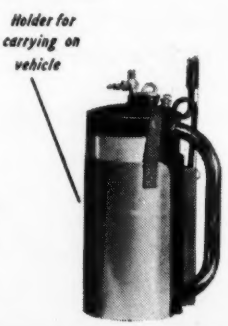

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Graf, L. G. Nesbitt, J. R.
Greve, N. F. Neu, R. L.
Haug, J. R. Nyland, R. D.
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Huppuch, C. D. Richard, A. E.
Woodmansee, D. W.

Northern California Section

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Batchelder, J. R. MacGregor, R. A.
Bates, J. C. Oswald, D. D.
Dresser, R. E. Rodgers, D. K.
Hammitt, J. H. Rodick, L. S.
Housden, E. N. Sebring, H. F.
Isberg, J. L. Seyden, J. H.
Johnson, R. E. Smith, C. O.
Krebill, R. G. Throop, J. E.
Lund, R. E. Tunheim, E. A.
Warnock, J. D.

Member Grade

Mervich, E. J., Forester, Hammond Calif. Redwood Co., Big Lagoon, Calif.; Univ. of Minn., B.S.F., 1950, (Junior 1954).

Northern Rocky Mountain Section

Student Grade

MONTANA STATE UNIVERSITY

Lund, R. C.

Junior Grade

Students Eligible for Automatic Advancement

MONTANA STATE UNIVERSITY

Barney, R. J. Korb, J. W.
Bednorz, J. C. Moehring, D. M.
Bloedel, E. E. Nelson, D. W.
Brigham, D. T. Oehs, D. E.
Coster, J. E. Pennington, A. M.
Foster, J. R. Rabone, H. M.
Galea, J. Sartz, C. L.
Hoffman, H. W. Schlueter, H. L.
Hollowell, A. J. Sorensen, F. C.
Jernigan, F. P. Stevens, M. E.

Ozark Section

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI

Allman, A. D. Luebehow, K. R.
Berkholz, R. C. Martin, J. W.
Booth, J. O. Maynard, A. S.
Capps, J. S. Minor, R. M.
Collett, L. M. Moose, R. G.
Cottingham, R. I. Onstott, B. G.
Crisan, J. R. Presley, J. J.
Gritman, J. C. Settergreen, C. D.
Heflin, E. L. Smith, T. M.
Hurlbut, D. B. Soehlig, L. A.
Krull, E. Solomon, C. E.
Lohmeyer, E. J. Ward, J. R.
Zeugin, R. F.

Member Grade

Davis, J. T., General Mgr., M. L. Sigmon Forest Products, Inc., Monticello, Ark.; Univ. of Mo., B.S.F., 1954, (Junior 1954).

Lord, J. S., Forester, Dierls Treating Plant, DeQueen, Ark., L.P.I., B.S.F., 1950, (Junior 1954).

Smith, A. M., Dist. Forester, Crossett Co., Crossett, Ark.; Yale, M.F., 1951, (Junior 1952).

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON

Fisk, M. W. Olson, R. D.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF WASHINTON

Daniels, D. S. Mifflin, J. M.
Davies, J. G. Miller, R. W.
Friis, R. E. Northman, R. W.
Geimer, R. L. Nunan, J. H.
Gregg, P. Pharis, R. P.
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Student Grade

UNIVERSITY OF FLORIDA

Laird, J. S.

UNIVERSITY OF GEORGIA

Brant, B. B. Johnston, G. W.
Parrish, W. F.

Junior Grade

Lucas, H. C., Project Forester, Camden, Ala., (Reinstatement).

Moody, R. D., Fish & Wildlife Coordinator, Int'l Paper Co., Mobile, Ala., L.S.U., B.S.F., 1949.

Richter, W. J., Group Leader, Union Bag-Camp Paper Corp., Savannah, Ga., (Reinstatement).

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Frazer, W. R. Neiswender, H. W.
Hazen, W. E. T. Stanford, M. H.
Windham, W. E.

UNIVERSITY OF FLORIDA

Arthur, J. L. Lewis, D. R.
Dazey, J. R. Olds, W. T.
Fraser, T. E. Parsons, H. T.
Harris, C. E. Smith, J. M.
Jacobs, D. K. Tolar, R. L.
Young, W. F.

UNIVERSITY OF GEORGIA

Batchelor, W. R. Jones, R. T.
Bledsoe, P. L. Kantziper, A. L.
Bryan, H. W. Lanier, J. R.
Burns, J. R. Little, J. W.
Clemens, K. G. Lunsford, J. D.
Crawford, S. W. McMurry, R. M.
Deaton, L. F. Moyers, W. H.
Durrence, H. H. Neal, H. L.
Eller, F. Parker, W. H.
Estes, F. O. Purvis, C. W.
Farr, L. E. Reno, W. L.
Fendig, J. G. Riddick, D. D.
Fulcher, B. R. Riley, H. P.
Gammon, G. L. Robertson, J. A.
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Taylor, B. J.

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Holston, G. W., Resident Mgr., Owen-Illinois Glass Co., Jacksonville, Fla.; Univ. of Ga., B.S.F., 1954, (Junior 1954).

Phillips, J. E., Div. Forester, Ga. Kraft Co., Macon, Ga., (Reinstatement).

Southwestern Section

Junior Grade

Wagle, R. F., Asst. Prof. of Range Mgmt., Univ. of Ariz., Tucson, Ariz., (Reinstatement).

Affiliate Grade

Howe, C. E., Forester, USFS, Overgaard, Ariz.

Upper Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Houtchens, F. L. Williams, H. S.

UNIVERSITY OF MINNESOTA

Berndt, W. A. Blackburn, R. A.
Billings, R. S. Holthus, D. C.

Junior Grade

Green, D. L., Asst. Forester, N. Dak. School of Forestry, Bottineau, N. Dak.; Iowa State, B.S.F., 1953.

Students Eligible for Automatic Advancement

IOWA STATE COLLEGE

Clausen, M. D. Lauritsen, M. K.
Jensen, W. L. Meyer, G. C.
Klinoff, R. H. Peters, D. L.

UNIVERSITY OF MINNESOTA

Bernd, C. K. King, J. W.
Borkenhagen, J. E. Koller, N. F.
Borrell, M. K. Mattson, R. B.
Cowan, P. C. Metzger, F. T.
Curtis, G. A. Myhre, R. A.
Engelby, O. E. Niskanen, T. N.
Engelsen, D. M. Roettgering, B. H.
Ffolliott, P. F. Schneider, R. W.
Grunewald, S. H. Schutz, R. J.
Hansen, A. Toutges, R. J.
Jarvis, E. E. Towler, R. J.
Wettergreen, J. W.

Washington Section

Member Grade

Lyon, H. G., Asst. to Asst. Secretary of Agric., Wash., D. C., Ore. State, B.S.F., (Junior 1954).

Salzman, F., Position Classifier, USFS, Wash., D. C., N. C. State, B.S.F., 1949, (Junior 1954).

Wisconsin-Michigan Section

Student Grade

MICHIGAN COLLEGE OF MINING & TECHNOLOGY

Godlevske, H. L.

MICHIGAN STATE UNIVERSITY

Bast, J. W. Gammon, A. D.
Cutsforth, M. M. Liimakka, A. W.

UNIVERSITY OF MICHIGAN

Bruce, R. D. Fahey, T. D.
Lanham, D. A.

Junior Grade

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MICHIGAN COLLEGE OF MINING & TECHNOLOGY

Aldrich, W. C. Malkoff, E. P.
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Carlson, B. R. Moore, J. T.
Daynard, R. O. Niver, C. R.
Golin, L. D. St. Avnold, U. S.
Kisabeth, F. A. Spiroff, C. I.
Klammer, R. E. Vande Hei, G. L.
Korseberg, R. G. Vogel, T. C.
LaBumbard, H. H. Watson, D. B.

MICHIGAN STATE UNIVERSITY

Aggerholm, D. A. Hallenius, C. J.
Anderson, A. O. Holman, W. J.
Arnold, J. D. Lukert, J. L.
Arps, R. H. Merkel, W. R.
Bey, C. F. Schimke, A. M.
Christensen, C. A. Skau, C. M.
Goodman, R. J. Thomas, A. J.
Gross, L. L. Willits, J. M.

UNIVERSITY OF MICHIGAN

Davidson, F. R. Martin, R. E.
Foster, R. L. Olsen, J. M.
Handorf, H. H Schmae, M. O.
Hedrich, D. R. Seidel, K. W.
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Forestry News

World Meeting on Timber Technology

The Instituto Forestal de Investigaciones y Experiencias at Madrid was the location for the Fourth FAO Conference on Wood Technology held from April 22 to May 2.

Some 60 delegates from 31 countries took part in the conference which was presided over by Mr. P. Martinez-Hermosilla, Director-General of Forests, Spain. L. J. Markwardt (assistant director of the U. S. Forest Products Laboratory, Madison, Wis.), J. Campredon (directeur, Centre Technique du Bois, Paris, France) and B. Thunell (director, Wood Technology Department, Forest Products Research Laboratory, Stockholm, Sweden) were elected vice-chairmen.

The Conference, an instrument for international exchange of information and coordination of basic research programs, singled out for action by FAO work on problems of building materials in housing: among such problems are grading systems for wood, better utilization of the inherent strength of structural sizes of wood, and improved methods of effecting wood preservation.

American Motors Awards Announced

Ten professional conservationists have been chosen to receive the current series of American Motors Conservation Awards, according to George W. Romney, president of the corporation. Each will receive $500 and a bronze plaque.

The ten professional conservationists named are: Robert R. Bowers, Charleston, W. Va., of the West Virginia Conservation Commission, Division of Education; Robert Cooney, Helena, Mont., wildlife biologist with the Montana Fish and Game Department; L. E. Crawford, Lawton, Okla., retired enforcement officer with the Oklahoma Department of Wildlife Conservation; Guy M. Brandborg, of Hamilton, Mont., retired national forest supervisor with the U. S. Forest Service; George Fell of Washington, D. C., executive director of Nature Conservancy; Paul Gilbert, Hot Sulphur Springs, Colo., wildlife biologist with the Colorado Game and Fish Department; Carl E. Haischer of St. Mary's, W. Va., work unit conservationist for the Department of Agriculture's Soil Conservation Service; Daniel L. Leedy of Silver Spring, Md., chief of the Division of Wildlife Research in the U. S. Fish and Wildlife Service; George W. McCullough, Minneapolis, Minn.; and Henry W. Moeseh, Jr., Indianapolis, Ind., administrative assistant to the director of the Indiana Conservation Department.

In addition, ten non-professional conservationists received plaques.

German Forester Tours U.S.

Walter Mann, chief of the Division of Forestry and Forest Products in the Federal Ministry of Food, Agriculture and Forestry, Bonn, Germany,

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arrived in Washington, D. C., in late May for a five-week United States Tour. The trip was made under the auspices of the State Department's Exchange Program. U. S. Forest Service Chief McArdle accompanied the visitor on most of his 25-state travels.

Mr. Mann was entertained on his arrival in this country at a small luncheon given for him by staff members of the American Forestry Association and the Society of American Foresters.

The Division of Forestry and Forest Products is primarily concerned with stimulating cooperation between the states of the Federal Republic of Germany, each of which has its own forestry organization, and with representing German forestry in international affairs.

Mr. Mann is a forestry graduate of Munich University and served with the State Forest Service in Bavaria for many years. After World War II, he was transferred to the Bizonal Administration in Frankfurt which was the forerunner of the present government in West Germany. In 1951 he assumed his present position as chief of the Division.

Department of Agriculture Honors Distinguished Employees

Dr. Nicholas T. Mirov, plant physiologist, California Forest and Range Experiment Station, Berkeley, was one of eight employees of the U. S. Department of Agriculture who received the Distinguished Service Award at the 12th annual honor ceremony May 21 in Washington, D. C. The presentations were made by Secretary of Agriculture Ezra Taft Benson.

Dr. Mirov, a native of Irkutzk, Siberia, Russia, was cited for "outstanding initiative, creative scientific contribution, distinguished authorship, and worldwide recognition in conceiving and conducting fundamental research into the physiology of forest trees and the chemistry of pine turpentine."

Those working in forestry and conservation who received Superior Service Awards were: Virgil S. Beek, Soil Conservation Service, Denver, Colo.; Frank E. Bivens, Soil Conservation Service, Union, W. Va.; Evan D. Bolton, Soil Conservation Service, Nacogdoches, Tex.; Clarence E. Cary, Forest Service, Milwaukee, Wis.; Roger R. Chamard, Forest Service, Corvallis, Ore.; Cecil W. Chapman, Soil Conservation Service, Washington, D. C.; Rudolph I. Geri, Forest Service, North Bend, Wash.; Phoebe O'N. Harrison, Soil Conservation Service, Washington, D. C.; Archibald C. Knauss, Forest Service, Portland, Ore.; Austin L. Patrick, Soil Conservation Service, Washington, D. C.; Floyd Nimmo, Soil Conservation Service, Sioux City, Iowa; Herman F. Olson, Forest Service, Milwaukee, Wis.; Claude L. Price, Soil Conservation Service, Monticello, Ark.; Harry E. Schimke, Forest Service, San Andreas, Calif.

Unit Awards were presented to Time-Temperature Tolerance Unit, Agricultural Research Service, Albany and Pasadena, Calif. and Division of Pulp and Paper, Forest Products Laboratory, Forest Service, Madison, Wis.

Peak Named for William R. Kreutzer, First Forest Ranger

A 13,120-foot peak on the Gunnison National Forest, Colo., four miles east of Tincup, has been named for William R. Kreutzer, first forest ranger in the United States. Approval of the Do-

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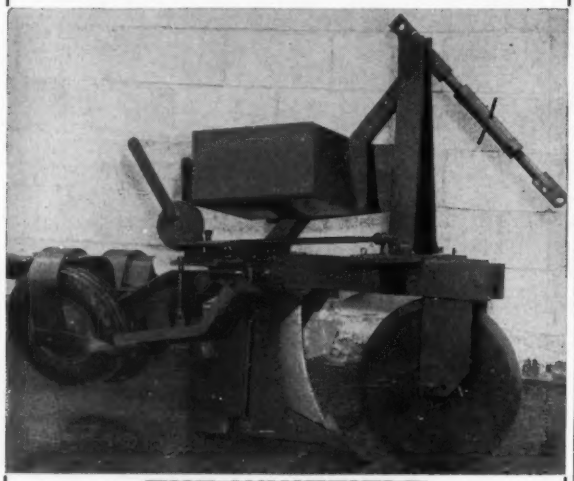

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mestic Names Committee of the U. S. Department of Interior for naming of the peak has been announced by Regional Forester Donald E. Clark.

Kreutzer was born in 1877, on a small cow ranch on Indian Creek, 30 miles southwest of Denver. At the age of 20, he gave up his job as a ranch hand to become a forest ranger. He served in Plum Creek Timber Land Reserve (now a part of the Pike National Forest); in Battlement Mesa Forest Reserve (now Grand Mesa-Uncompahgre National Forest); in the Gunnison Forest Reserve (now Gunnison National Forest), and on the Roosevelt National Forest, all in Colorado.

Kreutzer retired from the Forest Service, October 31, 1939, as supervisor of the Roosevelt Forest and died in Fort Collins, January 2, 1956.

A new book by Len Shoemaker, also a retired forest officer, entitled *Saga of a Forest Ranger,* published by the Colorado University Press simultaneously with the naming of the peak, tells the story of Kreutzer's adventures during his colorful career.

N.Y. Establishes Products Engineering Department

State University College of Forestry at Syracuse University has established a Wood Products Engineering Department. The move consolidates resources of the College's basic and applied timber science departments into a single organization having a strong engineering character to its instruction, service, and research.

The 14 teaching and research men staffing the Forest Utilization and Wood Technology Departments formed the new Wood Products Engineering Department. It also includes over two-thirds of the specially designed facilities and scientific and technical equipment comprising the new Hugh P. Baker Wood Products Laboratory.

Chairman of the new department is Eric A. Anderson, professor of wood technology, who joined the faculty in 1950. Formerly on the staff of the U. S. Forest Products Laboratory, Madison, Wis., Dr. Anderson goes to his new position from the chairmanship of the Wood Technology Department.

Next fall, about one-third of the student body will take major programs of undergraduate or graduate study in the new Wood Products Engineering Department, according to projections from the spring semester enrollment. The major programs leading to the B.S. degree from the department are: manufacturing, marketing, wood mechanics and physics, and wood anatomy.

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Georgia Studies Wood Residues

A $36,000 state-wide wood residue survey designed to bring new industry to Georgia got underway recently on a county-by-county basis, Frank Albert and Scott Candler, directors of the Georgia Forest Research Council and Department of Commerce, respectively, have announced.

The 159-county study is being financed by the Georgia Forestry Commission, Commerce Department, Research Council, and the U. S. Forest Service.

It is designed to provide accurate and up-to-date data on the availability of wood by-product raw material in the state for the information of industries which might locate there.

Forestry Commission and Forest Service personnel are pinpointing the location of all types of wood residue.

The study consists of three stages, according to Forest Products Technologist Rufus Page of the GFC and the USFS. They are the developing of wood waste conversion factors, listing the locations and types of residue, and compiling the information into a report and posting it on IBM cards for quick reference.

ITFA Holds Meeting

Forty members of the Illinois Technical Forestry Association attended the 40th quarterly meeting May 14 and 15 at Rock Island.

In addition to a business meeting, the ITFA sponsored field trips to pine

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plantations in the Henderson State Forest where members and guests viewed pruning, thinning, and growth-study plots installed by University of Illinois foresters in 1939.

Other visits were made to the Swords-Morton Veneer and Lumber Company, Rock Island, and Mississippi River bottomland timber administered by the U. S. Corps of Engineers. A discussion of the new "Tree Expert" bill passed by the 1957 Illinois legislature was presented by Dr. R. J. Campana, associate pathologist, Illinois State Natural History Survey, the association's president.

Central States Forest Tree Improvement Committee Organized

At a meeting at the Ohio Agricultural Experiment Station on June 12 representatives from industry and public agencies interested in forest genetics discussed the importance of focusing more attention on forest genetics in the Central States Region.

O. D. Diller, chairman, Department of Forestry at the Ohio Agricultural Experiment Station, was elected temporary chairman; and tentative plans were made to hold a formal meeting to exchange views on tree improvement problems in the region and to form a permanent organization.

Forest Soils Group Holds Summer Field Meeting

Forty-seven foresters representing industry, state, and federal agencies and colleges and universities of Oregon, Washington, and British Columbia attended annual summer meeting and field tour at Centralia, Wash. on June 12-14. The Weyerhaeuser Timber Company, through its Centralia Forestry Research Center, played host for the group and conducted a two and one-half day tour over their Clemson and Vail-McDonald tree farms. Company research specialists William Cummings, James King, and Dr. Gene Steinbrenner showed soil profile and forest tree growth plots and studies. Soil-site correlations from this work are expected eventually to provide specific guides to forest growth potential for various physiographic, soil, and climatic conditions.

The members of the group, which has been known as the Forest Soils Committee of the Douglas-fir Region, adopted a new name. The Committee's new title is: The Northwest Forest Soils Council. The new designation is expected to broaden the scope of the group's work and influence to include forest areas east of the Cascade Range. Commenting on this change Council Chairman George Schroeder stated: "The ever increasing interest in forest soils problems and work is evidenced by the number of foresters attending the Committee meetings and requesting assistance and information on this subject. The Council stands ready to assist any group or organization in the Northwest in furthering forest soils studies and forest resource improvement.

The Council's publication, "An Introduction to the Forest Soils of the Douglas-fir Region" was so well received that all copies have been sold. Additional requests for copies have been sufficient to warrant a second printing. The Council is investigating possible means of getting the printing done so that the cost of the publication will remain reasonable.

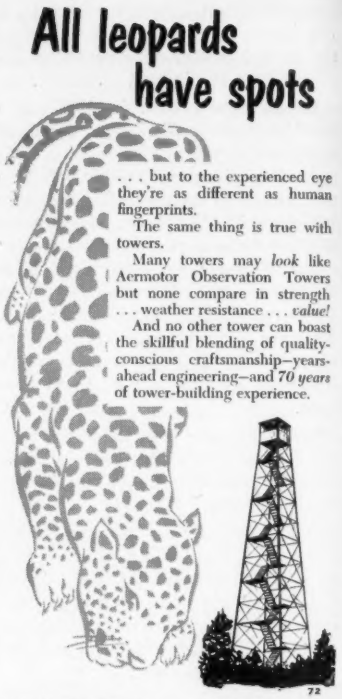
Fulbright Awards Available from the U. S. Government

Awards for university lecturing and advanced research abroad are available from the U.S. Government under the Fulbright Act during 1959-1960. Some 20 nations plus British Colonial territories in Africa are participating.

A number of the awards are available in forestry and closely related fields.

The closing date for applications is October 1, 1958.

Application forms and information are available from the Conference Board of Associated Research Councils, Committee on International Exchange of Persons, 2101 Constitution Avenue, Washington 25, D.C.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B. L. Orell Named to New Post

Bernard L. Orell, formerly vice president of Weyerhaeuser Sales Company, St. Paul, Minn. has been elected a vice president of Weyerhaeuser Timber Company and is being transferred to Tacoma, Wash., it was announced in June by F. K. Weyerhaeuser, president of the company.

Orell will direct and coordinate the overall resource relations and public affairs activities of Weyerhaeuser Timber Company and its subsidiaries. Under the program of coordination, the activities of the public information department and its personnel will remain unchanged.

Orell was elected a vice president of Weyerhaeuser Sales Company in 1953. He has also served as resource relations counsel for Weyerhaeuser Timber Company since 1954. Before joining the sales company, he held the position of state forester for the State of Washington from 1949 to 1953. His earlier experience included two years as assistant professor of forestry at the University of Washington, three years as protection inspector and training officer for the Oregon State Forestry Department, and four years with the U. S. Forest Service.

Orell, a native of Portland, Ore., is a graduate of Benson Polytechnic School, and of Oregon State College, where he earned B.S. degrees in forestry and education and a master's degree in forestry.

Olsson Elected to Chesapeake Corporation Office

Carl A. Olsson was recently elected vice president of the Chesapeake Corporation of Virginia, West Point, Va. Olsson is general woodlands manager of the corporation.

Industry Men Honored by Waltonians

Two Oregonians, Arthur K. Roberts and Irvin H. Luiten, were among three men named to receive the national honor roll award of the Izaak Walton League of America. Roberts is education director of the West Coast Lumbermen's Association, and Luiten is publicity manager for Weyerhaeuser Timber Company.

The awards were made at the annual League meeting in Colorado Springs in May.

Smalley Heads Armstrong Woodland Operations

Clarence Smalley was recently named by the directors of the Armstrong Forest Company as manager of the company's Department of Woodland Operations, Johnsonburg, Pa. He succeeded A. L. Bennett in that post when Mr. Bennett was named company vice president.

Smalley has been with Armstrong since 1945 and was at the time of his promotion assistant woodland manager. He is a graduate of Penn State and served with the Army in the Southwest Pacific during World War II.

Millwood Honored by Future Farmers

Charles Millwood, conservation forester, International Paper Company, Georgetown, S. C., was awarded the Honorary State Farmer Degree of the Future Farmers of America.

The degree, highest grade of membership that can be awarded in the Future Farmers of America on a state level, was given to Mr. Millwood in recognition of his valuable contribution in the development of the organization's program.

Jordan Manages AFPI Office

New district manager for the San Francisco, Calif. office of American Forest Products Industries is Robert L. Jordan. In that post, Jordan will direct activities in California, Arizona, and New Mexico.

Before taking up his present duties, Jordan was chief of information and education for the Montana State Forestry Department, Missoula, Mont.

Gair Scholarship Winners Named at Florida, Georgia Universities

T. W. Earle, president of Gair Woodlands Corp., has announced that Lloyd W. Barry, Jr., of Brooker, Fla., and Darryl M. Neidlinger of Rincon, Ga., have been elected winners of four-year forestry scholarships, each valued at $500 per year.

Barry will attend the University of Florida and Neidlinger, the University of Georgia. One such scholarship is awarded at each of the universities annually.

Industry Establishes Wood Promotion Program

At the spring meeting of the directors of the National Lumber Manufacturers Association, held May 25-28 in Santa Barbara, Calif., a million-dollar wood promotion program was approved.

The program, designed to spur sales of lumber and wood products, will include national advertising, an educational campaign directed toward those responsible for developing building codes and fire insurance rates, preparation of text books, encouragement of students to seek careers in scientific fields related to wood use, and the development of farm markets.

AFPI Reports on Survey of Industrial Forest Management

American Forest Products Industries, making public results of its first nationwide survey of forest management on industry lands, said lumber, pulp-paper, plywood, and other industries now spend $14,300,000 a year on forest fire protection, $1,750,000 on insect and disease control, $38,725,000 on general management practices, and $2,100,000 on research.

AFPI said the survey showed 92 percent of timberlands owned by the wood-using industries is under permanent management for future timber crops. Industry programs, the survey also indicates, are contributing to the small woodlot owner's management practices through the Tree Farm program and by technical assistance. Of the 3,100 technical foresters employed by land-owning forest industries, 475 are assigned to assist farmers and

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other owners of small woodlots, AFPI said.

Industry interest in contributing to better management of small woodlands, according to AFPI, is apparent from the fact that farmers and other small landowners must be looked to for a great portion of future raw materials. Pulp and paper companies presently obtain only 24.3 percent, and lumber companies only 42.4 percent, of their timber requirements from lands owned by industry.

The AFPI survey covered 448 companies, including 280 lumber and plywood companies, 121 pulp and paper companies, 16 integrated mills, and 31 other companies.

Crown Zellerbach Forester Transferred

Crown Zellerbach's Northwest timber department has announced the transfer of C. H. Willison, Jr., assistant chief forester, from Port Angeles, Wash. to Portland, Ore.

According to C. W. Richen, Northwest timber department manager, Willison will assume increased forest management responsibilities in his new location.

Prior to his Port Angeles residence, Willison was with the forestry department of Crown Zellerbach in Portland. He graduated from Oregon State College and later instructed in forest management as assistant professor at OSC and the University of Idaho.

With the transfer of Willison, Crown Zellerbach timber and forestry assignments for the peninsula are as follows: K. C. Osier, manager of Puget Sound wood supply including purchase of chips and logs for the Port Angeles and Port Townsend mills; B. F. Ross, superintendent, Neah Bay Tree Farm, Neah Bay; R. A. Brandes, resident forester, Olympic Tree Farm, Port Townsend; and J. F. Barinaga, resident forester and pulp wood buyer for Port Angeles division, Port Angeles.

California Forester Receives Award for TV Film

The American Association for Conservation Information's National Award for "The Outstanding Television Production for 1957 by a State Conservation Agency" was presented to California State Forester Francis H. Raymond.

The winning program is a 13-minute motion picture, "The Careless Crime," in which the financial responsibility of each individual who illegally or negligently causes forest fires is stressed.

Judges of entries made by several states and Canadian provinces included: Ida N. Garrielson, president, Wildlife Management Institute; Charles H. Callison, conservation director, National Wildlife Federation; Richard Stroud, executive vice president, Sport Fishing Institute; Joseph Penfold, conservation director, Izaak Walton League of America; and Michael Hudoba, *Sports Afield* magazine.

Fritz and Wohlenberg Associated as Consultants

Emanuel Fritz, professor of forestry emeritus, and E. T. F. Wohlenberg, professor emeritus in industrial forestry, have become associated as forestry consultants, it was announced recently. The two will maintain separate offices in Ukiah and Berkeley, Calif.

They are primarily interested in forest management and logging plans designed to place lumbering operations on a permanent basis, economic studies, timber valuation, wood utilization, and advice in lawsuits involving wood.

Professor Fritz retired in 1954 from the University of California. He has been active as a consultant since 1934. Professor Wohlenberg joined the Yale forestry faculty in 1954 and established there the first course in industrial forestry. He retired from Yale in June of this year.

Hilden Retires After 42 Years With M-O Paper Co.

Retirement of Fred M. Hilden, timber buyer with 42 years of service to Minnesota and Ontario Paper Company, was announced in April by George B. Amidon, director of woodlands.

F. T. Frederickson, forestry supervisor for the Minnesota M-O operations, was placed in charge of the Minnesota purchase wood program, in addition to his forest management responsibilities.

NLMA Scholarship Winners Announced

Six forestry school students have been awarded special scholarships by the National Lumber Manufacturers Association.

Each scholarship winner received a cash award of $500, travel expenses, and ten weeks' on-the-job training in wood products research, which began

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June 23, at the Washington, D. C., laboratory of the Timber Engineering Co., research-engineering affiliate of NLMA.

The winners, chosen on the basis of scholastic records, aptitudes, interests, and extra-curricular activities from students nominated by 11 of the nation's forestry schools, were: Rodney K. Wilson, Colorado State University; Donald L. Crews, Michigan State University; Erwin M. Campbell, Purdue University; Robert W. Erickson, University of Minnesota; Paul C. Kersavage, Pennsylvania State University; Ray E. Renaud, Iowa State College.

The NLMA scholarship program, now in its ninth year, is designed to encourage more students to seek employment in the private wood industries.

Education

Helsinki University Confers Honorary Degree on H. L. Shirley

Hardy L. Shirley, dean of the State University College of Forestry at Syracuse University, Syracuse, N.Y., became the first American to receive an honorary doctoral degree from the University of Helsinki. It was bestowed upon Dean Shirley in recognition of the many years of service he has contributed to world forestry as an educator and research scientist. He is presently chairman of the United Nations Food and Agriculture Organization's Panel on Education in Forestry.

This summer, Dean Shirley is visiting forestry colleges and universities and is conferring with top forestry officials in Russia, as well as in other parts of Europe. He attended and participated in the first European meeting of the Empire State Paper Research Associates, Inc. (ESPRA), which was held June 4-6 in Amsterdam, The Netherlands.

In Russia, Dean Shirley will be visiting the Kirov Forestry Academy, near Leningrad; the Agricultural Academy in Kiev; the Forestry Technical School in Kharkov; and several research institutes and academies in Moscow and vicinity.

Forestry Students Receive Awards at School Ceremony

At an informal Awards ceremony in June five pulp and paper technology students received scholarships and cash awards at the State University College of Forestry at Syracuse University, Syracuse, N. Y. Hardy L. Shirley, dean of the school, made the presentations.

The first annual A. E. Staley Manufacturing Company scholarship of $500 was awarded to James H. Allen of Binghamton, N.Y., a junior.

Robert A. Dykes of Kingston, N.Y., received the fourth annual $300 scholarship given by the Pennsylvania, New Jersey, and Delaware Division, American Pulp and Paper Mill Superintendents Association of Chicago.

A $300 award was given by the Mead Corporation to John M. Roubie, a junior from Watertown, N.Y.

The third annual Boxboard Research and Development Association scholarship of $250 went to James F. Craner, Manlius, N.Y.

Cyril Geacintov of Syracuse received the seventh annual Fred C. Boyce Student award of $200.

J. S. Boyce Retires from Yale Professorship

John Shaw Boyce, professor of forest pathology at the Yale University School of Forestry since 1929 and chief pathologist of the Department of Agriculture since the same year, retired June 30.

Professor Boyce, whose book *Forest Pathology* has been a standard text in its field since 1938, is engaged at present in making a third revision of the volume.

The Yale forester served as chairman of the National Research Council's Committee on Forestry in 1940-1942, and in 1925 was the United States delegate to the International Congress of Forestry at Grenoble, France.

Professor Boyce received his B.S. and M.F. degrees in 1911 and 1912 from the University of Nebraska and took his Ph.D. degree from Stanford University in 1917.

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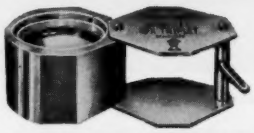
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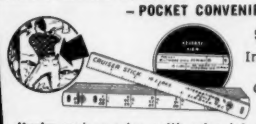
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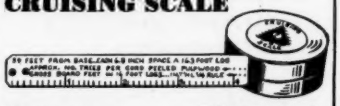
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two years in 1910 and again in 1919 when he became scientific assistant and assistant pathologist in the Division of Forest Pathology. From 1920 to 1928 he was pathologist in charge of the Department's Portland, Ore., branch, and for the next year was principal silviculturist and director of the Northeastern Forest Experiment Station.

He is a Fellow of the American Association for the Advancement of Science and a member of American Phytopathological Society, Botany Society of America, Connecticut Academy of Science, and Sigma Xi.

University of Georgia Host to Southern Schools

Over 150 forestry students from seven schools participated in the recent First Annual Conclave of Southern Forestry Schools at the University of Georgia's Rock Eagle 4-H Center near Eatonton, according to Harvey Johnson, president of the Forestry Club, which sponsored the event.

One of the highlights of the day was the concluding banquet at which B. E. Allen of the Union Bag-Camp Paper Corporation spoke.

Various events, ranging from log burling to axe throwing to academic dendrology and timber estimating, were entered into for prizes awarded by numerous industrial groups. In addition to individual prizes, the top three schools in the contest received awards. Winners were the University of Georgia, first; Louisiana State University, second; and Stephen F. Austin State College of Texas, third.

A plaque to be passed around to the winning schools each year was presented to Dr. A. M. Herrick, dean of the Georgia School of Forestry.

Other schools in attendance were the University of Florida, Mississippi State College, Alabama Polytechnic Institute, North Carolina State, and Clemson College.

Dils Named Leader of Watershed Unit

A watershed management unit established at Colorado State University is headed by Robert E. Dils, formerly associate professor of water resources at the University of Michigan.

Appointment of Dr. Dils to lead the cooperative watershed management unit—first of its kind in the United States—which will be established in the College of Forestry and Range management at Colorado State University, was announced by CSU President Wil-

ROBERT E. DILS

liam E. Morgan. Clinton H. Wasser is dean of the College.

Dils joins the University staff August 1 and is designated Pack professor of watershed management and leader of the cooperative unit. The Charles Lathrop Pack Forestry Foundation helped in establishment of the unit through a recent $50,000 grant.

Dr. Dils received forestry and watershed management training through bachelor's and master's degrees at Colorado State University and a doctorate in soil science from Michigan State University. He has served as collaborator for the U. S. Forest Service, Soil Conservation Service, Michigan Department of Conservation and Lake States Forest and Range Experiment Station, on watershed and hydrologic research projects. Other professional background includes eight years on the forestry staff at Michigan State College, two years at the University of Michigan, and several months research assistant in forestry for the Colorado Agricultural Experiment Station. He was timber management assistant for the Helena National Forest, Mont., for a time. In 1956 he was chairman of the Division of Watershed Management, Society of American Foresters, and is currently associate editor for forest soils and watershed management for the JOURNAL OF FORESTRY.

The Pack Foundation grant will assist the University in securing graduate assistantships for watershed management research, and providing laboratory facilities. The Rocky Mountain Forest and Range Experiment Station will cooperate in the unit by assisting with research.

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Ogden Forester Promoted to Washington, D. C.

George Vitas, assistant chief in the Division of Information and Education, Intermountain Region of the U.S. Forest Service, for the past two years, has been promoted to the Washington Office of the Service, it was recently announced by Regional Forester Floyd Iverson.

In his new post, Vitas has charge of forestry information pertaining to the small forest ownerships throughout the United States.

A University of Michigan forestry graduate in 1937, Vitas has done post graduate work in the fields of writing, radio, and television. He served with the armed forces from 1943 to 1946 and operated a consulting forestry firm in Houston, Tex., after being discharged from Army duty.

He was appointed information specialist for the Forest Service at Atlanta, Ga., in 1947 and also served in this capacity in the Washington Office of the Forest Service. Before going to Ogden he served as forest ranger for six years on the Pisgah National Forest in North Carolina.

Custer Forest Supervisor Transfers

William J. Lucas, supervisor of the Custer National Forest with headquarters in Billings, Mont., has been promoted to a position in the Division of Recreation and Lands in the Washington Office of the Forest Service, according to an announcement by Regional Forester Charles L. Tebbe, Missoula, Mont.

Prior to his appointment in December 1955 as supervisor of the Custer National Forest Mr. Lucas served as assistant supervisor of the Sawtooth

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LOUIS C. HERMEL

National Forest in Twin Falls, Idaho. He was graduated from the School of Forestry, University of Idaho, Moscow, where he specialized in range management. He began work in the Montana-Idaho region of the Forest Service as a range examiner in 1937. Following his appointment as district ranger on a Wyoming national forest in 1941 he spent four years in military service.

John S. Forsman, a graduate of Montana State University School of Forestry, succeeded Lucas as supervisor. He has been serving as assistant supervisor since 1955.

Region 9 Personnel Changes Announced

Louis C. Hermel has been promoted and transferred from his position as supervisor of the Superior National Forest, Duluth, Minn., to become assistant regional forester and chief of the Division of State and Private Forestry in the U.S. Forest Service's regional office at Milwaukee, Wis. This was announced in June by Regional Forester Arthur W. Greeley.

Replacing Hermel as supervisor of the Superior is Lawrence P. Neff, previously supervisor of the Shawnee National Forest, Harrisburg, Ill. Paul J. St. Amant moves to the Shawnee post from the Division of Timber Management in the Milwaukee office.

William M. Foss Promoted

William M. Foss has been named an assistant commissioner of conservation for the State of New York.

Foss was formerly director of the division of lands and forests of the state's Conservation Department.

Keith D. Lange Wins Award

Keith D. Lange, forester, Corps of Engineers, Savannah District, has been presented a $200 cash award for superior performance by Col. R. C. Bahr, district engineer.

LAWRENCE P. NEFF

According to the recent announcement by Col. Bahr, Lange's work as chief of timber harvesting has displayed a high degree of originality and technical competence in timber sales procedures and has been a main factor in the accomplishment of the district's timber disposal program in a manner which reflected credit to the Corps.

Mr. Lange has been with the Corps of Engineers seven years. He is a 1939 graduate of the University of Idaho. Before his employment by the Corps he served 11 years with the Tennessee Valley Authority's Division of Forestry Relations.

A. E. Smith to Staff Position

Promotion of Alex E. Smith from a staff officer position on the Wenatchee National Forest, Wash., to assistant division chief in information and education at the headquarters of the Pacific Northwest Region of the U.S. Forest Service in Portland, Ore.,

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has been announced by Regional Forester J. Herbert Stone. He will fill the vacancy caused by the transfer of Gail Baker to the division of fire control at the regional office.

Smith received his forestry education at the University of Washington and started his Forest Service career in 1937 as a seasonal worker. He served in the Navy during World War II.

Brackebusch Joins Fire Laboratory

Arthur P. Brackebusch has been appointed research forester with the Intermountain Forest and Range Experiment Station according to announcement by Reed W. Bailey, director. He will work with the station's Forest Fire Laboratory at Missoula, Mont., and with forest fire protection agencies throughout the Intermountain region.

Brackebusch was graduated from the School of Forestry at University of Idaho in 1949. Following graduation he did timber management work for the U. S. Forest Service and the Bureau of Land Management in Oregon. During his military service overseas, he worked as cartographic technician with the army. More recently he has worked with Tree Farmers, Inc. and with the Thompson Falls Lumber Company.

Named to Utilization Post

Earl R. Priegel has been named to the position of marketing and utilization specialist at the Denver regional office of the U.S. Forest Service.

A 1950 Utah graduate, Priegel had previously been on extension work with Kansas State College, served as farm forester with the Missouri Conservation Commission, and worked for a private stave and sawmill company.

PAUL J. ST. AMANT

Reigner Heads Northeast Research Unit

Irvin C. Reigner has been appointed leader of the Kingston, Pa., Research Center of the Northeastern Forest Experiment Station. This announcement was made by Ralph W. Marquis, director of the station.

Reigner has been acting center leader since the Kingston post was vacated in 1955 by M. C. Howard, who was transferred to Milwaukee, Wis.

Reigner, who received forestry degrees from both Penn State and Duke Universities, first joined the Northeastern Station in 1946.

Maryland Personnel Trained for Atomic Fall-Out

The entire protection force of the Maryland State Department of Forests and Parks has completed basic radiologic detection and safety training instruction as an aid for woodland fire control and for assistance to local populations if atomic fall-out disasters might occur in forested rural areas.

This is understood to be one of the few state-wide non-defense organizations over the country to prepare itself for this type of safety and relief operations, according to State Forester H. C. Buckingham.

The radiologic detection and safe action instruction was the second section of a course undertaken at the request of the State Civil Defense Agency, Buckingham stated. The first section was given at last year's forest fire training session.

A specialized State Civil Defense training team conducted the training, assisted by military coordinators from Fort Detrick, Fort Meade, and from the Second Army Command. Three days of a forest fire training session were given to the course, a combination of theoretic instruction and field test exercises.

Hile Appointed to Eastern Region Office

Seymour G. Hile, former staff assistant in the supervisor's office of the Cumberland National Forest in Kentucky, has been appointed to the position of assistant to the chief of coop-

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erative forest management of the Eastern Region of the U.S. Forest Service.

Mr. Hile attended the Pennsylvania State College and Mont Alto Forestry School and graduated from North Carolina State College in 1930 with a degree in forestry. Shortly after graduation he started his career as forester and later as a camp superintendent with the C.C.C., working with the Pennsylvania Department of Forests and Waters.

In 1940, Mr. Hile transferred to the Green Mountain National Forest in Vermont as assistant ranger, later moving to the White Mountain National Forest in New Hampshire and Maine. During World War II he developed lumber-production information for the War Production Board in Northern New England.

In 1950 he transferred to the Cumberland National Forest in Kentucky and in 1955 was advanced to the position of resource management staff officer in the Forest Supervisor's Office at Winchester, Ky.

Helena Forest Supervisor Retires

Arthur D. Moir, Jr., for 14 years supervisor of the Helena National Forest, retired in mid-June following 40 years of service with the U.S. Forest Service, according to an announcement by Regional Forester Charles L. Tebbe, Missoula, Mont.

Vernon O. Hamre, assistant supervisor, will succeed Mr. Moir.

Mr. Moir was appointed supervisor of the Helena National Forest in 1944 following a two-year assignment in the Division of Range Management of the Regional Office in Missoula. He began his career with the Forest Service in 1918. He was appointed assistant supervisor on the Lewis and Clark National Forest in 1925. In 1930 he transferred to a similar position on the Chelan National Forest with headquarters in Okanogan, Wash., and was promoted in 1931 to supervisor of the Colville National Forest in eastern Washington and in 1936 he became supervisor of the Umatilla National Forest at Pendleton, Ore.

Mr. Hamre has been serving as assistant supervisor of the Helena National Forest since last year following service on the Bitterroot National Forest as district ranger and staff assistant. Hamre's association with the Forest Service began in 1943 when he was appointed a lookout. He worked seasonally from 1943 to 1948 on the Coeur d'Alene National Forest in Idaho prior to his transfer to Montana and the Bitterroot National Forest.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

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Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., Penn State, 1953. Age 28, married, one child, veteran. Employed by state forestry department under Cooperative Forest Management Program (Private Woodland Management) for past 2½ years. Varied forest district work in same department prior to preceding. Desire emp'oyment in forest management in Northeastern states, preferably private industry.

Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., 1952. Age 27, single. Six years with United States Government in Rocky Mountain States. Experience includes cruising, timber sale supervision, fire control and administrative work. Interested in work with a future in forestry or related field. Northeast preferred but will consider anywhere in the world.

Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., 1955. Married. 2 years officer Corps of Engineers; 1 year industrial forest management included marking multiple products, protection, administration, T.S.I., close work with timer buyers. Desire similar or related position in Northeast or Mid-Atlantic states.

Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., Univ. of Georgia 1948; M.F., North Carolina State 1950. Age 36. 10 years experience includes 5½ years in log, lumber, pole, piling, post, and pulpwood purchase and production; 2½ years as Forest Editor and Photographer for a daily newspaper; 2 years of forest research. Prefer position as buyer and/or supervisor of logging or small mill operations in Southeast.

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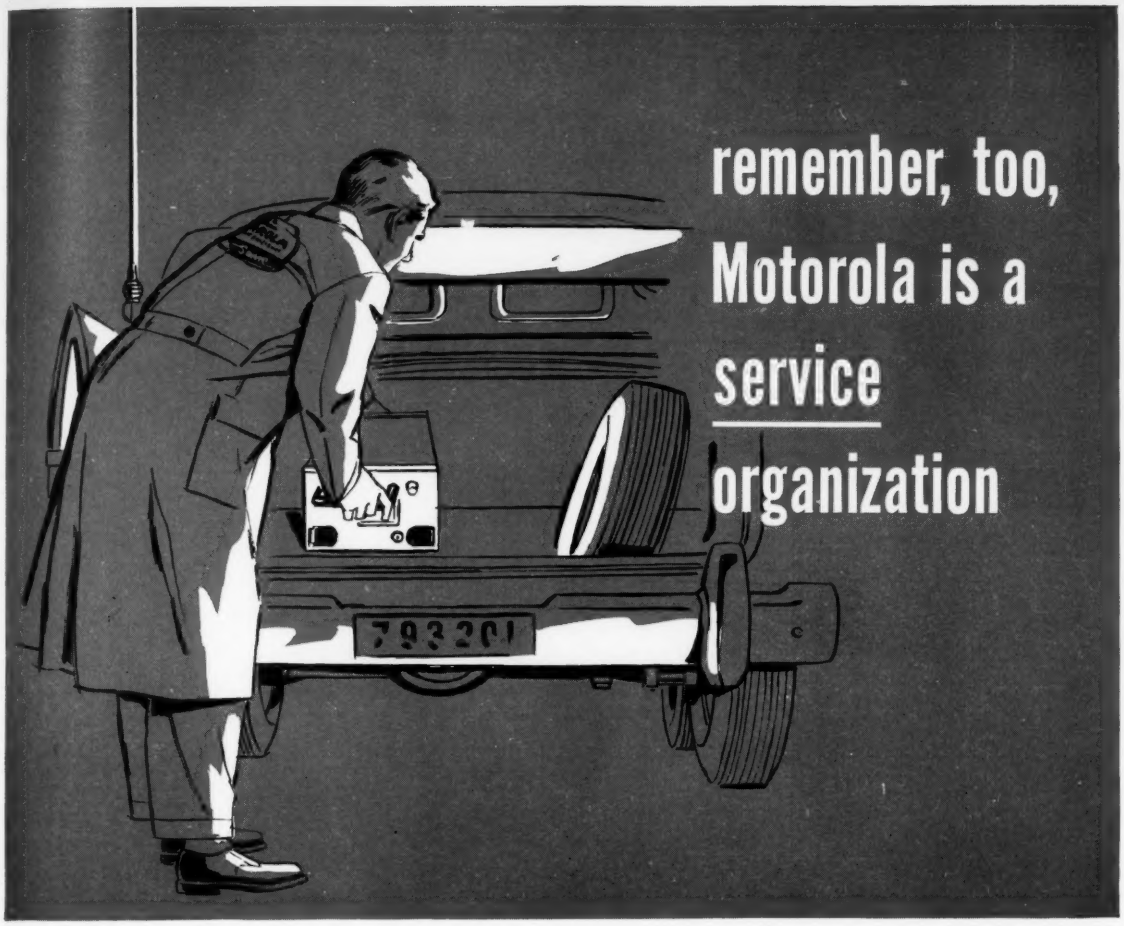

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